Methodology Used to Prepare the State of Maine 2002 Emissions Inventory

Including Criteria and Hazardous Air Pollutant Emissions from Point, Area, Mobile & Biogenic Sources

(for Data Submitted to EPA on June 1, 2004 and Revised on May 1, 2005)

Prepared by the Maine Department of Environmental Protection for EPA's 2002 National Emissions Inventory

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1. INTRODUCTION AND PURPOSE OF MAINE'S 2002 EMISSIONS INVENTORY

This narrative explains how the Maine Department of Environmental Protection (DEP) derived the emission estimates for the State of Maine's Preliminary Emissions Inventory for 2002, which was filed electronically with the U.S. Environmental Protection Agency (EPA) on June 1, 2004, with revisions and additional data filed on April 29, 2005. The Maine Emissions Inventory was submitted to fulfill Maine DEP's obligation for compiling an inventory under the State's Implementation Plan, and the Consolidated Emissions Reporting Rule, found at 40 CFR part 51. The 2002 Emissions Inventory contains estimates of release for both criteria air pollutants (CAPs) and hazardous air pollutants (HAPs). Maine DEP has filed emission estimates for point, area, mobile and biogenic sources of air pollution.

These emissions estimates are also used as model inputs to determine whether or not Maine is meeting ambient air quality standards. EPA, Regional Air Planning Organizations (RPOs), and state organizations will run these models. The inventory is also the basis for determining trends in emission releases and for determining what additional actions, if any, are needed to attain and maintain State and Federal ambient air quality guidelines. These data can also be used by the Air Toxics Advisory Committee (ATAC) of the Maine Air Toxics Initiative (MATI). ATAC is assessing whether or not HAPs pose a risk to Maine citizens, the highest priority HAPs, and solutions to reducing the risk. The Maine DEP intends to publish this inventory information on our website and to allow the public to review, evaluate, and use emissions information. This data will also be considered by U.S. EPA as they develop the National Emission Inventory (NEI) for 2002.

1.1 DEFINITIONS

1.1.1 What are Criteria Air Pollutants?

The term "Criteria Air Pollutants" (CAPs) means the six (6) air pollutants for which the U.S. EPA has promulgated health-based National Ambient Air Quality Standards (NAAQS) under the Clean Air Act. These pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter (measured as particulate matter under 10 microns (PM_{10}) and fine particulate matter, under 2.5 microns ($PM_{2.5}$)), and sulfur oxides (measured as sulfur dioxide (SO_2)). Certain other pollutants transform into the criteria pollutants in the air, and therefore are also tracked by air agencies. Specifically, certain volatile organic compounds (VOCs) are precursors to ozone, and ammonia (NH_3) is a precursor to $PM_{2.5}$.

1.1.2 What are Hazardous Air Pollutants, Maine Hazardous Air Pollutants, and Air Toxics?

The term "Hazardous Air Pollutant" or HAP means one of 188 compounds regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP). The HAPs are listed under the Clean Air Act, Section 112 (b) and 65 FR47348. Maine DEP collects emissions data from point sources for an additional 38 pollutants, which are listed in Appendix A of Maine DEP Rules, Chapter 137, "Emissions Statements"[1]. Together, the 188 federal HAPs and the additional 38 state pollutants make up the Maine Hazardous Air Pollutants (MEHAPs).

"Air Toxics" (AT), as used in this document, refers to a very broad group of air contaminants that, in sufficient concentration, could cause serious health effects to people breathing air that contains them. National Ambient Air Quality Standards have not been established for these compounds. Many air toxics are known or suspected to cause cancer, or adverse respiratory, neurological, immune or reproductive effects. Often certain sub-populations, such as children or people with weakened immune systems, are more susceptible to air toxics.[2]

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[1] A copy of 06-096 CMR 137 is available from the Maine Secretary of State's Web Page at: http://www.state.me.us/sos/cec/rcn/apa/06/chaps06.htm.
[2] EPA Technology Transfer Network, Air Toxics Website, National Air Toxics Assessment, downloaded 9/19/03. (http://www.epa.gov/ttn/atw/nata/gloss1.html)

1.1.3 What is the National Emissions Inventory?

National Emission Inventory (NEI) means the nationwide database containing estimates of the emissions of air pollutants as specified in 40 CFR Part 51, Subpart A. The U.S. EPA prepares this national inventory with input from numerous state, regional and local air agencies. These data are used for air dispersion modeling, regional strategy development, regulation setting, and tracking trends in emissions over time, among other things. According to EPA,

> "[t]he National Emission Inventory (NEI) is a comprehensive inventory covering criteria pollutants and hazardous air pollutants (HAPs). The NEI was created by the EPA's Emission Factor and Inventory Group (EFIG) in Research Triangle Park, North Carolina. Previously, EFIG developed and maintained two separate inventories for HAPs and Criteria pollutants. The two emission inventories were called the National Toxic Inventory (NTI) and the National Emission Trends (NET) inventory. The NTI was for hazardous air pollutants (HAPs) and the NET was for criteria pollutants, and they sometimes used different procedures for determining emissions from the same sources. For 1999 [and 2002], the EPA decided to combine the inventories into a single comprehensive inventory covering both criteria pollutants and HAPs. The new name is the National Emission Inventory (NEI)"[3]

1.1.4 What is Chapter 137?

Chapter 137 means Maine DEP Rules, Chapter 137, "Emission Statements," (effective June 23, 1998), also referenced as 06-096 CMR 137[4]. This rule is administered by the Bureau of Air Quality and requires stationary sources that emit significant quantities of air pollution to report those emissions. The rule applies to all areas of the State and to all stationary sources that emit or have the potential to emit (PTE) criteria pollutants at or above certain thresholds. The thresholds for criteria pollutants are as follows:

Carbon monoxide (CO)	100 tpy
Sulfur dioxide (SO_2)	40 tpy
Volatile organic compounds (VOC)	25 tpy
Nitrogen oxides (NO_X)	25 tpy
Fine Particulate Matter (PM_{10})	15 tpy
Lead (Pb)	0.1 tpy

"tpy" means tons per year

The rule also applies to all stationary sources that use, process, manufacture or emit (to the air or a sewage treatment plant) specified quantities of any of 226 compounds listed in Appendix A of the rule. Generally, the reporting threshold for these MEHAPs is 1 ton. Chapter 137 was modified in 2004, however, the thresholds listed above and found in Appendix A of this document were in effect during inventory year 2002.

1.1.5 What is i-STEPS®?

"i-STEPS®" means the software, created by Pacific Environmental Service (now MACTECH) that is utilized by the Bureau of Air Quality to develop, store and in some cases calculate the emissions for criteria pollutants from point sources. Maine DEP currently utilizes i-STEPS® Version 5.0, Client/Server, and Satellite i-STEPS® Version 5.0. The satellite version of i-STEPS® is the software, licensed by Maine DEP, for use by large point sources in their criteria pollutant inventory submittal.

[3] READ ME file for the 1999 NEI Version 2 for Criteria Pollutants, Air Chief Compact Disc, Version 10, January 2003 (US EPA's Emission Factor and Inventory Group (EFIG), Research Triangle Park, North Carolina, info.chief@epa.gov, 919-541-1000)
[4] This rule is currently undergoing revisions to ensure, among other things, that DEP obtains all the information it needs to file complete reports to EPA under the CERR. *Coordinators must check, at least quarterly, the National Emission Inventory website for updates to the NIF.*

1.2 AN INTRODUCTION TO AIR EMISSION INVENTORIES

Maine DEP and EPA have standard protocols to estimate the amount of pollutants that are released to the air. Estimations are usually made by multiplying "activity data," such as gallons of fuel burned, times an "emission factor," such as pounds of pollutant released per gallon of fuel burned. By convention, air emission inventories are often broken down into four major categories: point sources, area sources, mobile sources, and background sources. These categories are described in more detail below.

1.2.1 Point Sources

"Point sources" is a category comprised of stationary facilities that emit pollutants above a certain threshold, from a stack, vent or similar discrete point of release. The threshold varies between inventories, but federal rules usually establish the threshold at 10 tons per year of a single HAP, or 25 tons of a mixture of HAPs. The CAP threshold is established federally in the Consolidated Emissions Reporting Rule (CERR) and in Maine DEP Rules, Chapter 137. Estimates of point source releases are derived from summing the releases from each facility that reports. Each facility may estimate their pollutant release either from direct measurement, or based on standard estimation techniques for the relevant process at the facility.

1.2.2 Area Sources

"Area sources" are sources of air pollutants that are diffused over a wide geographical area. Area sources include emissions from smokestacks, vents or other point sources, that in and of themselves are insignificant, but in aggregate may comprise significant emissions. An example would be emissions from small dry cleaners or home heating boilers. Area sources also comprise emissions that do not come from a specific point source, such as air toxics volatizing from house painting, chainsaws or lawnmowers. Estimations of pollutant losses for many subcategories are made using standard techniques, often based on losses per capita or per employee.

1.2.3 Mobile Sources

"Mobile sources" are sources of air pollution from internal combustion engines used to propel cars, trucks, trains, buses, airplanes, ATV's, snowmobiles, etc. Mobile source inventories are often further broken down into on-road vehicles, and off-road vehicles. EPA has published models that are used to estimate releases of pollutants from these categories.

1.2.4 Background and Biogenic Sources

"Background" means the concentrations of CAPs and HAPs that are from natural sources (also called "biogenic sources") and man-made pollutants that are either still in the air from previous years emissions or have been emitted outside the inventory area and then transported into the region. Maine DEP depends on EPA to run models that determine releases from the natural sources. Likewise, an assessment of a chemical's properties and complex air models are used to determine contributions from outside the state or from previous emission years.

1.3 UNCERTAINTY IN EMISSION ESTIMATES

There are several areas of uncertainty built into emission estimates. There may be varying degrees of certainty in measurement of "activity data," such as population. EPA and Maine DEP attempt to obtain the most recent and accurate activity data for use in inventories. There is a trade-off between the two goals because it takes some time to compile and review the data for accuracy. For expediency, current activity data is sometimes projected from older data.

Additionally, there will be varying sources of information. EPA and Maine DEP try to obtain the most accurate data possible. However, the most accurate data is often only available for a localized area. When making a national or statewide inventory, the most accurate data does not always cover the area needed. In other cases only state-wide data is available. In that instance, the statewide number is apportioned across the state, often relative to population or some other relevant surrogate that is known on the county level.

There is also uncertainty inherent in using emission factors. Emission factors are most accurate for the individual stack and equipment for which they were developed and only after several tests to confirm representative operating conditions. Emission factors from one process or facility are often applied to a similar facility, a convention which introduces a higher level of certainty. Emission factors for area sources are usually based on standard emission factors. For point sources, the emission factors diminish in accuracy in descending order for the following sources of information:

1. Emission estimates based on continuous monitoring systems;

2. Recent periodic monitoring of emissions (such as stack tests) under representative operating conditions;

3. Emission estimates based on facility-specific emission factor developed in accordance with standard procedures; and

4. Standard emission factors applicable to the source from publications, such as EPA's AP-42.

EPA and Maine DEP attempt to increase accuracy and decrease uncertainty of emission estimates for the sources that have the greatest impact. Point source estimates for an individual facility are generally the most accurate. Whenever the information was available to Maine DEP, uncertainty factors are included in the calculations used to develop the Air Toxics Priority List. However, this information was difficult to extract from the 1999 National Emissions Inventory, and Maine DEP's efforts are ongoing as this draft document goes to press.

1.4 INTERELATIONSHIP OF EMISSIONS INVENTORIES, MODELING AND AMBIENT AIR MONITORING

Emission inventories, modeling, and ambient air monitoring are all used to determine the concentration of pollutants in the ambient air. Ambient air monitoring can be used to document actual exposure concentrations, or the amount of an air pollutant in the ambient air that a person might breath. However, for most air toxics, analytical methods have not been developed that can detect air toxics in the ambient air at the low levels that can cause health impacts. Therefore, the few detectable air toxics are often used as indicators for other compounds. Additionally, air monitoring by itself can not tell us where an air toxic originated, so we can not determine how to stop the release.

Air modeling is often used to help track down the source of a contaminant, and predict the concentration of air toxics that can not be accurately monitored in low concentrations. Models can also be used to help predict concentrations of air toxics at locations that are not monitored. However, calibration and verification of a model's accuracy depends on actual ambient air monitoring results. Additionally, models require that accurate meteorological and emissions data be input into the model.

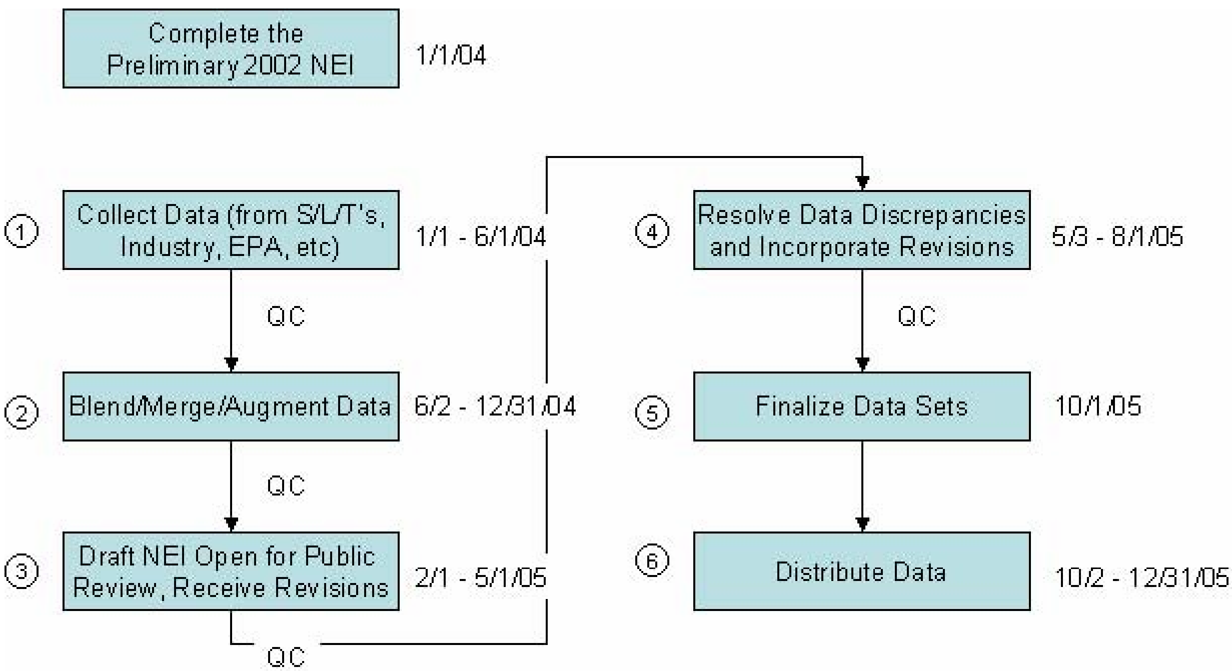
Emission inventories are used as model inputs. Feedback from modeling results and ambient air monitoring, however, can also help detect sources of contaminants that have not been accounted for in emissions modeling. In this way, monitoring, modeling, and emissions inventories are the three legs of the stool upon which good air quality assessment sits.

1.5 OVERVIEW OF THE MAINE DEP PROCESS USED TO DEVELOP MAINE'S 2002 PRELIMINARY EMISSION INVENTORY

1.5.1 Interface with the NEI Preparation

The 2002 inventory will be the first one in which each state is required to file an emissions statement for criteria air pollutants under the Consolidated Emissions Reporting Rule (CERR). To aid the states in developing their inventories, EPA agreed to calculate preliminary estimates of emissions from each state. The states were then able to review these calculations. If the calculations were accurate, the state could file EPA's estimates to meet the requirements of the CERR. If the estimates appeared to be inaccurate, the states were to generate accurate estimates, and file those. EPA also requested the states to file emission estimates for HAPs.

EPA's proposed schedule and steps for the main NEI preparation are as follows:



EPA did not complete its preliminary 2002 NEI until May,2004. Consequently, this wait, along with staff turn-over in the inventory program, delayed development of the Maine DEP Emissions Inventory. This, in turn, resulted in fewer quality control reviews than the Maine DEP had hoped would be accomplished.

1.5.2 Interface with MANE-VU Modeling Efforts

The Mid-Atlantic/Northeast Visibility Union (MANE-VU) is conducting air transport modeling as part of the Ozone Transport Commission's (OTC) work to develop a regional approach to resolve ozone and haze exceedances along the eastern seaboard. MANE-VU's modeling will simulate the atmospheric chemistry involved in the formation of ozone and fine particulate matter from the emissions of thousands of sources in the northeastern United States (and, possibly, Canada). The MANE-VU inventory includes all source types including industrial point and area sources, automobiles, non-road sources such as locomotives and marine vessels, and biogenic emissions.

Part of Maine DEP's emission inventory will be one of the inputs into this model. In order to complete the modeling work in a timely manner, MANE-VU will need to begin modeling using this preliminary emissions inventory. To increase the accuracy of the emissions inventory, MANE-VU launched a project to develop emission calculation guidance for states to use in those cases where EPA guidance did not exist. The intent was to ensure emission inventory consistency throughout the Ozone Transport Region, increase the accuracy of the June inventory submittal, and develop consistent model input formats for the MANE-VU photochemical modeling team.

Personnel turnover in the inventory program at Maine DEP prevented the Department from running the mobile source models to generate emission estimates. However, MANE-VU's contractor, Pechan, ran the on-road and non-road mobile emission models for Maine DEP, since MANE-VU needed the emissions data for criteria pollutant modeling. MANE-VU graciously provided these calculations to Maine DEP so that Maine DEP could file with EPA the inventory emission estimates for mobile sources.

More information about MANE-VU and this modeling project are available on the MANE-VU website at http://www.manevu.org/.

1.6 OVERVIEW OF MAINE DEP'S INVENTORY DEVELOPMENT

The Emissions Inventory Program within the Maine DEP's Bureau of Air Quality is responsible for generating and maintaining air emissions inventories for the Maine DEP. For the 2002 inventory, the inventory team consisted of the members listed in Table 1.

Table 1: Maine DEP Inventory Team Members

Name	Assignments	Phone	e-Mail address
David Wright	Section Leader Select Area Sources Biogenics	207-287-6104	David.W.Wright@Maine.gov
Rich Greves	HAP Point Select Area Sources NIF	207-287-7030	Rich.Greves@Maine.gov
Tammy Gould	CAP Point Mobile Sources Select Area Sources NIF	207-287-7036	Tammy.Gould@Maine.gov
Lisa Higgins	QA/QC Officer Select Area Sources	207-287-7023	Lisa.Higgins@Maine.gov
Becky Hodsdon	CAP Point	207-287-8672	Becky.S.Hodsdon@Maine.gov
Doug Saball	Select Area Sources	207-287-8123	Doug.Saball@Maine.gov
Marc Cone & Engineering Staff	Point QC Reviewers	207-287-7049	Marc.A.Cone@Maine.gov

For the 2002 Maine inventory, the initial step was to determine the scope of inventory. The 2002 inventory was a full inventory, to be filed with EPA for incorporation into the National Emissions Inventory. As such, Maine DEP needed to develop emissions for pollutants in the following pollutant classes:

- Hazardous Air Pollutants (HAPs), also know as the Air Toxics ; and
- Criteria Air Pollutants (CAPs).

For each of the pollutants in these classes, emissions from the following major source categories were needed:

- Area Sources (also known as Nonpoint Sources);
- Point Sources, which are required to report their emissions under 06-096 CMR Chapter 137;
- Mobile Sources (including On-road and Non-road Sources); and
- Biogenic Sources.

Maine DEP's inventory submission for the point source emissions of CAPs needed to meet the standards established in the Consolidated Emission Reporting Rule (CERR), found at 40 CFR Part 51.

In addition, Maine DEP needed to determine the resources available to undertake the full inventory. Maine DEP has established programs to compile CAP and HAP emissions from stationary point sources, as described below. Maine DEP used existing personnel to review EPA area source calculations and generate other area source calculations, for submission to the NEI. Maine DEP used the emission estimates generated by EPA for the biogenic portion of the inventory. Finally, as discussed above, for Maine's mobile emissions estimate, Maine DEP submitted to EPA the emission estimates developed by Pechan for the MANE-VU inventory.

2. POINT SOURCE INVENTORY

2.1 MAINE DEP PROCESS USED TO GENERATE POINT-SOURCE EMISSION ESTIMATES

The compilation and filing of point-source emissions is the responsibility of the Bureau of Air Quality's Emissions Inventory Program. The program gathers emission statements from point sources under 06-096 CMR Chapter 137. For the 2002 Inventory year, the CAP reporting thresholds are shown in Table 2. Under the rule, if a facility exceeded a threshold for one criteria pollutant, it had to file an emission statement that estimated emissions for all of the criteria pollutants. Likewise, if either actual emissions or potential emissions were exceeded, the facility was required to report emissions of all of the CAPs. Emission information down to the process level is filed with Maine DEP for CAPs.

Table 2: Reporting Thresholds for CAPs for the 2002 Inventory Year

Pollutant	Reporting Threshold (Tons Per Year)
Carbon monoxide	100
Sulfur dioxide	40
Volatile organic compounds (VOC)	25
Nitrogen oxides (NOx)	25
Fine Particulate Matter	15
Lead	0.1

Emission reporting thresholds for HAPs were contained in Appendix A of Chapter 137and are included in Appendix A of this report. Generally, the reporting thresholds were set at one ton of a specific HAP, but some carcinogenic HAPs had a threshold set at 200 pounds, and some persistent, bioaccumulative compounds were even lower. Facility-wide emissions of HAPs are reported to Maine DEP.

Maine DEP maintains information on point source CAPs in an i-STEPS® database. HAPs data is maintained in the HAPs database, which was built by the Emissions Inventory Program using Microsoft Access© database software. Individual point sources generate emissions numbers using protocols appropriate to its individual processes. The Emissions Inventory Program gathered emission statements in 2002 using the following procedures, which are illustrated in Figure 1:

1. **Request Emission Statement.** The Emissions Inventory Program sent a notice to all sources subject to the reporting rule, notifying them of their obligation to file, and how to file a report. When requested, the Maine DEP provided an electronic copy of the previous year's data (2001) to speed the filing. This is often requested for CAPs. The previous year's data set is extracted from the DEP's i-STEPS® Oracle database.

2. **Filing of Information.** Facilities then provided its emission data for the 2002 inventory year. Facilities reporting CAPs would often simply update and re-submit the electronic data provided by Maine DEP. Facilities used Satellite i-STEPS® to view and update the electronic data. The i-STEPS® program can generate CAP emission estimates when a company inputs activity data. Local emission factors may be input, or default emission factors in i-STEPS® may be used. The default factors in i-STEPS® are input from the *FIRE* database.[5]

[5] From EPA's website, http://www.epa.gov/ttn/chief/efinformation.html: "The Factor Information Retrieval (*FIRE*) Data System contains EPA's recommended emission estimation factors for criteria and hazardous air pollutants from stationary sources. *FIRE* includes information about industries and emitting processes, the chemicals emitted, and the emission factors themselves. *FIRE* allows easy access to criteria air pollutant emission factors obtained from the *Compilation Of Air Pollutant Emission Factors* (AP-42), the *Locating and Estimating* document series, and the retired AFSEF and XATEF documents. *FIRE* is designed for use by local, state, and federal agencies, environmental consultants and others who require emission factor information for estimating both criteria and toxic air emissions from stationary sources."

3. **Receive and Load Data.** Data is filed with the Maine DEP in either paper or electronic form. HAP statements were almost exclusively filed in paper form. CAPs were often filed in electronic form, primarily with the Satellite i-STEPS® software program, but also via PDF, e-mail, or spreadsheet form. Maine DEP then loads the data into the appropriate CAP or HAP database.

4. **Validate and Correct Facility Emission Data.** The Maine DEP's Emissions Inventory Program then conducts quality control checks of the point source data. CAPs data is reviewed using the i-STEPS® QA checker and the i-STEPS® Infinity C/S that is included with the MACTEC Software. For both HAPs and CAPs, inventory staff run DEP-designed reports against the database to compare statements to similar facilities for prior years. Any discrepancies are then cleared up with the facility, and the database is corrected.

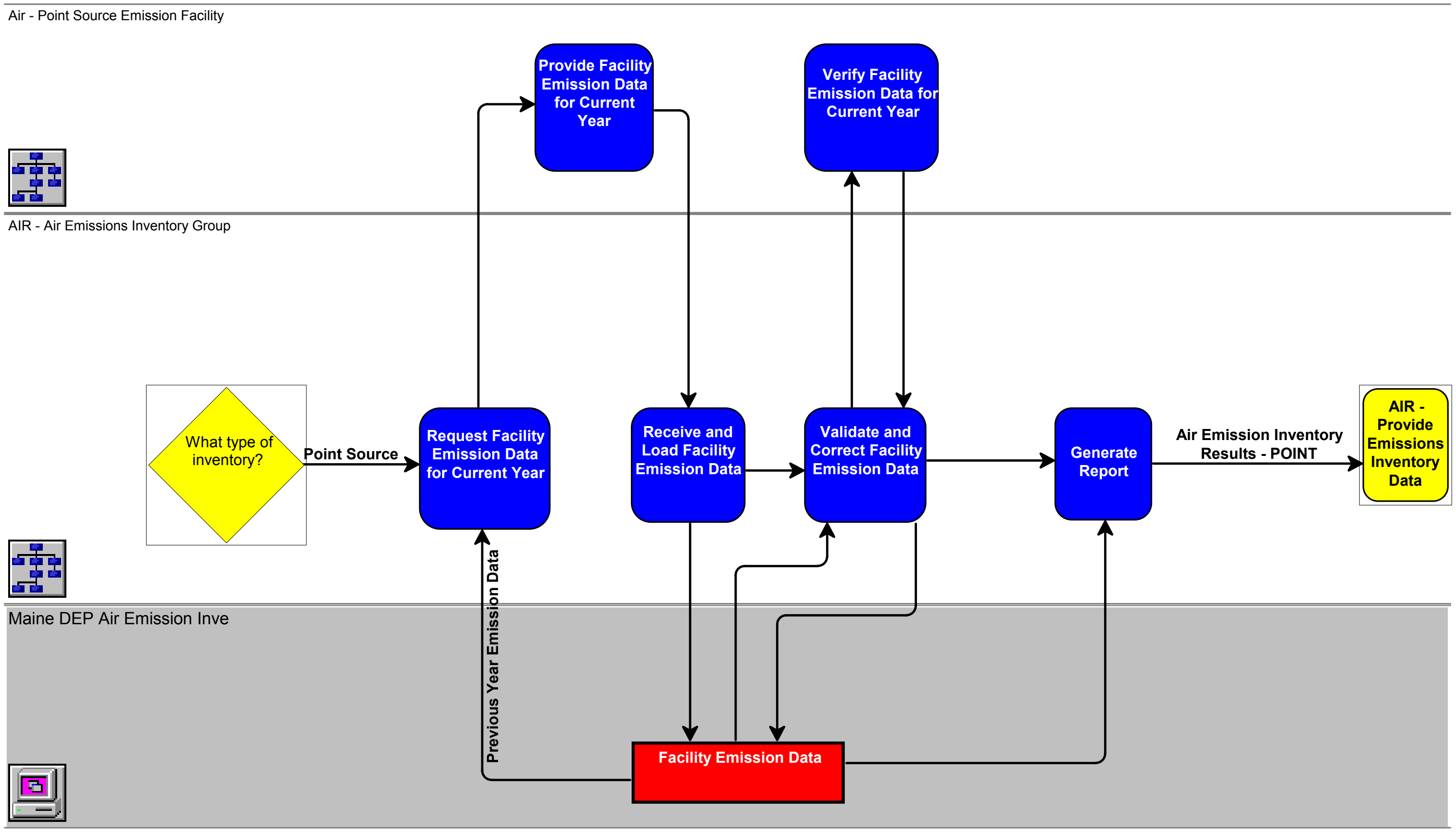
5. **Quality Assurance (QA) Check.** Emission statements for 2002 were reviewed by the Maine DEP's Bureau of Air Quality engineers that license air pollution control equipment at the facility. The engineers check database reports for each facility for consistency with prior years emissions, license conditions, use of appropriate emission factors, and to be sure that all licensed process units were included in the emission statements. This review is much easier for criteria pollutants, since calculations down to the process level are filed with Maine DEP. The QA check was completed prior to submission of the point source CAP data to EPA on June 1, 2004. The license engineers quality assurance checks of the HAP data took much longer since the inventory program was late in requesting the review and supporting calculations had to be requested from the facilities. The QA check on point source HAPs was not completed prior to Maine DEP's June 1, 2004 filing but will be complete in time for the February, 2005 State review of the NEI.

6. **Facility Review.** If the licensing engineers find discrepancies with an emission statement, the data in the appropriate database is changed, and then a new emission statement is sent to the facility for review and approval. Any disagreements are worked out between Maine DEP and the facility, and the final decision is entered into the database.

7. **Filing with EPA.** The CAP and HAP point source data is then filed with U.S. EPA using the National Input Format, version 3.0(NIF 3.0). Quality assurance checks were conducted with EPA's Basic Format and Content Checker software, version 3.01, June 3, 2004.

8. **Subsequent Revisions.** Subsequent discrepancies due to reviews by Maine DEP, EPA or data users such as MANE-VU are discussed among the interested parties, and then made to the database. Every attempt is made to alert the facility, data-user, and EPA to any changes made to the database by Maine DEP.

Figure 1: Process Flow Model showing how Maine DEP generates Point-Source emission estimates



2.1.1 Point and Area Source Estimation Overlap

The reporting thresholds for both CAPs and HAPs are lower under Maine rules than under federal rules. Therefore, EPA's area source estimation protocols sometimes capture estimates that have already been collected under Maine's point source inventory. To avoid double counting, once the point source inventory is complete, Maine DEP extracts pollutant estimations for the facilities in the point source inventory that are also subject to area source estimates. The emissions attributable to point sources are then subtracted from the appropriate area source category. The specific area source categories from which point source emissions are subtracted are detailed in the specific area source methodologies described in Section 5, "Area Source Inventory."

2.1.2 Point Source Name Changes

In past years, when attempting to augment the Maine DEP's point source inventory, EPA has added prior year emission estimates from facilities that did not appear to report in the current year. Often the facility has reported, but the ownership of the facility has changed names. This has resulted in double counting of emission estimates. Appendix D lists the facilities that have transferred its air emission licenses. In other cases, facilities have stopped operations, and are therefore not emitting pollutants. A list of air licenses that have expired (but have not been renewed) or that have been surrendered, are included in Appendix E**.** EPA may use these appendices to help determine whether an emission source has been properly excluded from Maine's point source inventory.

2.1.3 Results of Point Source Emissions

2.1.3.1 Criteria Air Pollutant Emissions

The CAP emission estimates for each point source that Maine DEP filed with U.S. EPA on June 1, 2004 and revised on May 1, 2005 are included in **Appendix B**. After our original submission in 2004, the Maine DEP did find several significant reporting errors which were corrected in the 2005 submission.

Figure 2 shows the relative percentage of the 2002 point source CAP emissions by pollutant type for the entire state. Figure 3 shows the relative contribution of CAP emissions by the top ten facilities in the state with the highest total CAP emissions.

Figure 2: Relative Emission of Maine's Criteria Air Pollutants from Point Sources in 2002, by Weight

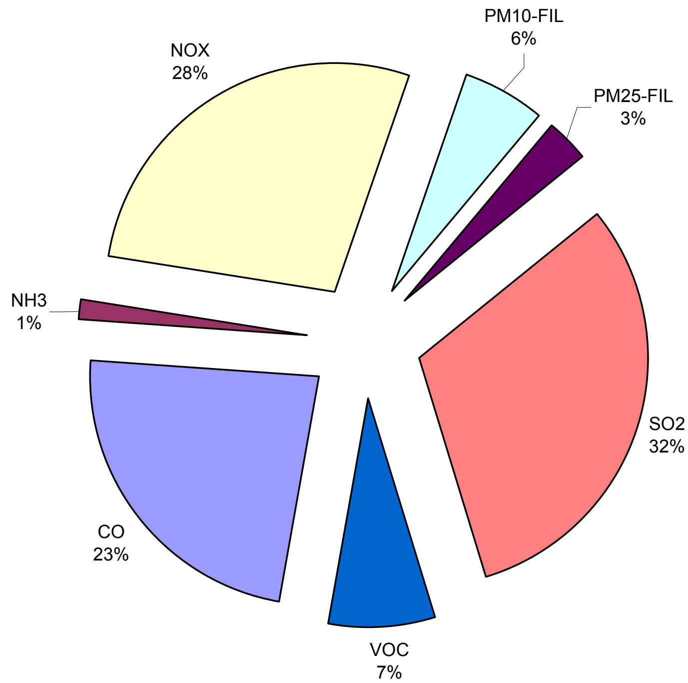
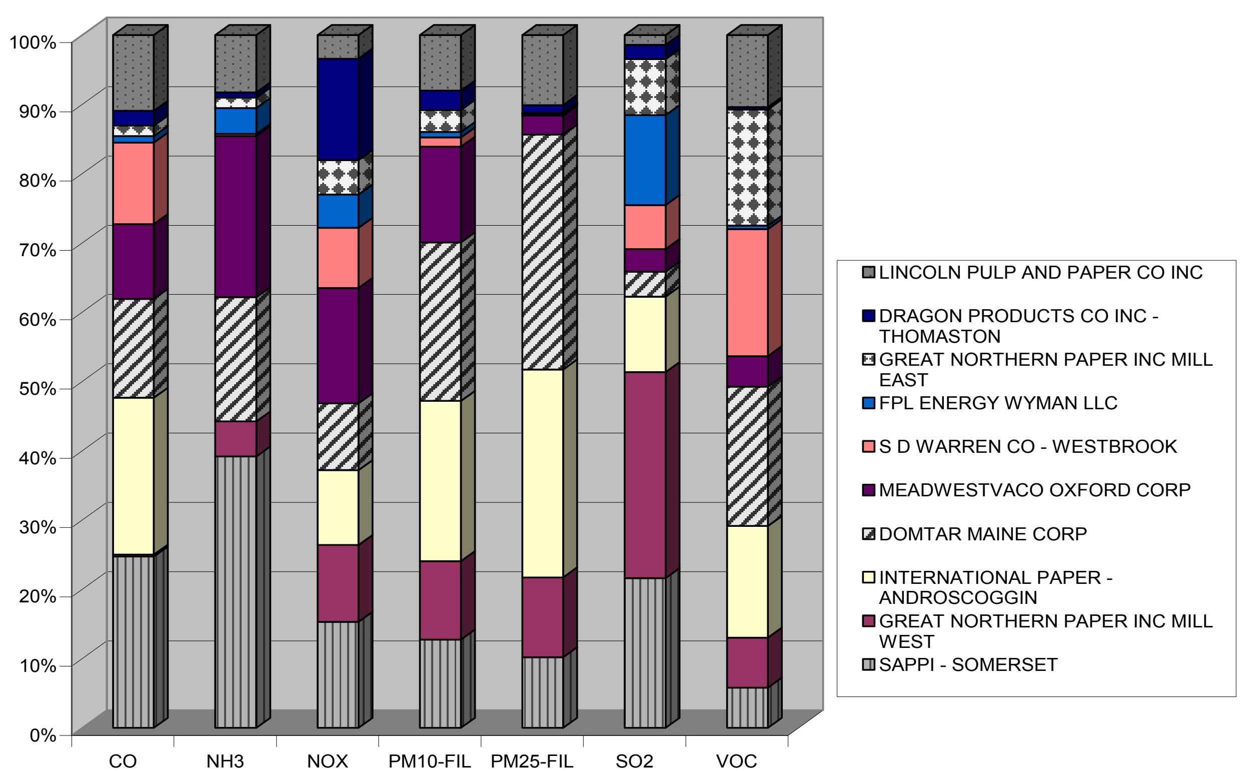


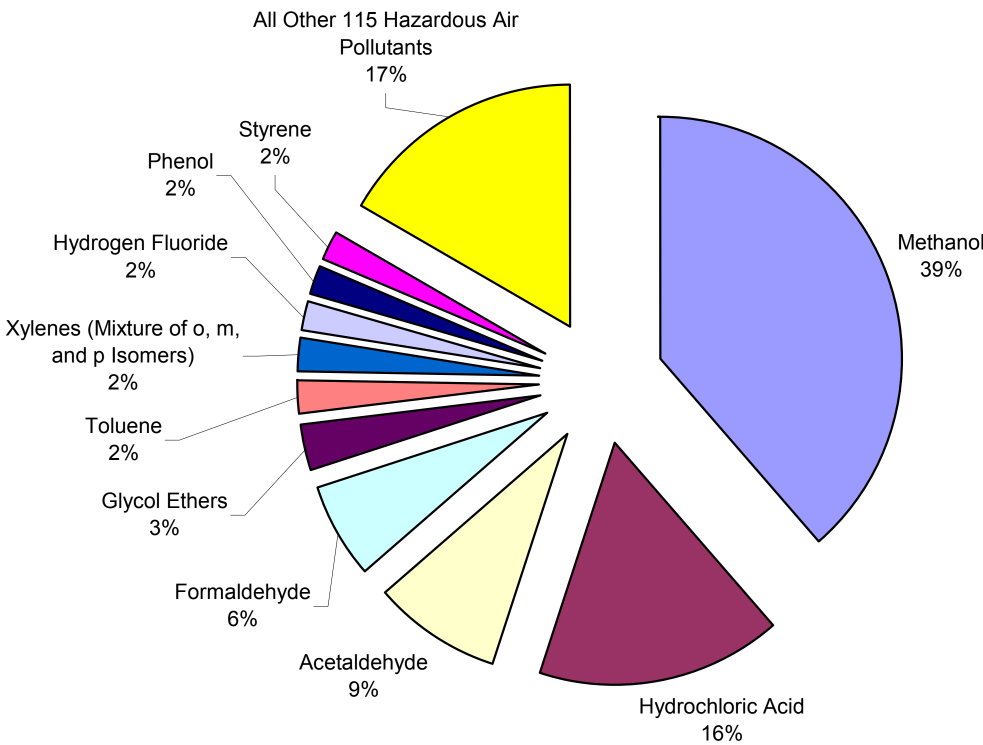
Figure 3: Relative Emissions by Weight of Criteria Pollutants by Top 10 Companies in Maine



2.1.3.2 HAP Pollutant Emissions

The Maine DEP filed HAP estimates from Maine's point sources with EPA on June 1, 2004 and revisions on May 1, 2005. These HAP emission estimates for each point source are included in Appendix C. Maine filed emission data on 125 HAPs from more than 130 sources in Maine. Figure 4 shows the relative percentage of the 2002 point source HAP emissions in Maine by pollutant type.

Figure 4: Relative Emission of Maine's Point Source Hazardous Air Pollutants in 2002, by Weight



3. MAINE'S 2002 MOBILE SOURCE INVENTORY

3.1 ON-ROAD MOBILE EMISSIONS

3.1.1 Introduction

State-specific travel information was provided by the Maine Department of Transportation (MDOT) and was used in conjunction with MOBILE 6.2 to calculate Maine's on–road emissions. Personnel turnover in the inventory program at Maine DEP prevented the Department from running the on-road mobile source model to generate emission estimates. However, MANE-VU's contractor, Pechan, ran the model for Maine DEP, since MANE-VU needed the emissions data for criteria pollutant modeling. MANE-VU graciously provided these calculations to Maine DEP so that Maine DEP could file with EPA the inventory emission estimates for mobile sources.

3.1.2 Estimation Methods

The process used for calculating mobile source emissions involved the use of VMT (vehicle miles traveled) data for the state. The VMT data, compiled by MDOT, was provided to the Air Bureau from data maintained in their TINIS database (Transportation Integrated Network Information System). The VMT data was arranged by roadway functional class and speed categories for each county in Maine. Each functional class could then be associated with a certain speed in the MOBILE 6.2 model. The model provided emission factors for four (4) different roadway types (freeway, arterial, local, and freeway ramp) at selected speeds.

3.1.2.1 Calculations of the VMT Mix

Maine DOT provided the DEP with a spreadsheet of *2002 Travel Activity by Vehicle Type and Functional System*. This data included eight (8) vehicle types. The data then had to be split into the sixteen (16) different vehicle classes considered by the MOBILE 6.2 model, using data from EPA's *Travel Activity by Vehicle Type* table (M6_Utility.xls), which is a piece of the MOBILE 6.0 model, resulting in a percent-of-travel for each vehicle type. Using this estimate of 2002 percent-of-travel data and the travel activity by vehicle type, the VMT mix for each roadway class in Maine could be determined.

An example of the VMT mix calculation for Passenger Cars is as follows:

(% Travel for DOT vehicle class) x (% of that Travel equal to mobile source vehicle type)= VMT mix for specific roadway functional class

Maine DOT provided information on the *Summer Adjusted 2002 Daily VMT by Estimated Speed.* This data was based on an annual average daily-traffic-count along various lengths of roadway (called links) for each county. It was then broken-down into roadway functional class categories.

3.1.2.2 Estimation Procedures for Mobile Sources

Annual and average day on-road (i.e., highway) mobile source emissions of VOC, nitrous oxides (NO_x), ammonia (NH_3), particulate matter (PM10-PRI and PM2.5-PRI), sulfur dioxide (SO_2) and carbon monoxide (CO) were calculated from the VMT data using emission factors derived from MOBILE 6.2 for all counties. The emission factors are expressed as grams of pollutant, per mile of travel, for each speed and roadway type. The all-vehicle emission factors (a composite emission factor, weighted by a percentage of vehicle types that make up the vehicle-miles-traveled) were multiplied by the VMT associated with the specific speed and functional class, to arrive at emissions in grams. These emissions were then converted to tons (by multiplying the number of grams by the conversion factor of 907,184.86 g. /ton) and reported as tons per weekday or year.

The MOBILE 6.2 model may also be used to calculate vehicle-refueling emissions in grams per mile. As part of the June 1, 2004 submission, Maine did not include the refueling emissions as part of the on-highway mobile estimates.

Additional variables in the MOBILE 6.2 model include ambient temperature and Reid Vapor Pressure (RVP), which is a measure of the volatility of gasoline used in-state. Pechan used data from the "2002 Maine Fuels Report" to determine quarterly RVP and performed five separate MOBILE 6.2 modeling runs to account for seasonal RVP variability around the state.

Stage II vapor recovery is a control measure that was applied to York, Cumberland and Sagadahoc counties (moderate non-attainment area 1), while the National Low Emission Vehicle (NLEV) program was applied statewide.

Modeling for Cumberland County also included both an Anti-Tampering program (ATP), which is a check for the presence of a catalyst and gas cap, and a program called I/M for Inspection and Maintenance. The I/M program monitors evaporative gas-cap pressure losses from light-duty gasoline powered vehicles built after 1973.

3.1.2.3 Summary of Emissions from Mobile Sources

Table 3 shows the tons of CAPs that were emitted in each county of Maine by on-road mobile sources. Table 4 shows the CAP breakdown by type of on-road vehicle statewide. Figure 5 shows the percentage of each criteria pollutant that made up the total CAP emissions from on-road sources in Maine in 2002. Figure 6 shows the vehicle types that made up the VOC emissions statewide in 2002.

Table 3: Maine Tons of Criteria Air Pollutant Emissions from On-Road Sources by County

Pollutant Code		CO	NOX	VOC	SO2	NH3	PM10-PRI	PM25-PRI
Total Emissions (Tons)		**410957.8**	**54686.8**	**23037.4**	**1803.9**	**1467.5**	**1239.1**	**934.4**
23001	Androscoggin	25543.4	2605.9	1582.2	98.9	91.9	62.5	45.4
23003	Aroostook	21656.3	2617.7	1200.6	93.2	77.7	62.7	46.9
23005	Cumberland	84981.8	11675.2	4830.4	373.2	307.2	256.2	192.9
23007	Franklin	9767.4	1109.3	512.4	41.3	34.7	27.5	20.5
23009	Hancock	20177.8	2126.8	1146.2	85.4	74.1	55.7	41.1
23011	Kennebec	40988.5	5897.5	2295.1	184.5	145.2	129.5	98.5
23013	Knox	10654.1	1131.1	608.0	44.8	38.8	29.3	21.7
23015	Lincoln	10773.1	1154.3	600.8	46.5	39.6	30.6	22.7
23017	Oxford	16162.3	1852.0	864.3	66.8	57.3	43.9	32.5
23019	Penobscot	48126.6	6880.8	2678.6	212.5	169.1	148.3	112.5
23021	Piscataquis	5093.1	556.9	278.9	21.9	18.5	14.5	10.8
23023	Sagadahoc	13335.5	2158.8	725.3	62.8	46.5	45.5	35.1
23025	Somerset	19134.4	2623.7	1017.5	85.4	67.2	59.5	45.2
23027	Waldo	12042.5	1287.4	687.2	50.3	43.8	32.8	24.2
23029	Washington	11959.2	1321.6	640.7	50.5	43.0	33.3	24.8
23031	York	60561.8	9687.8	3369.1	285.9	212.8	207.1	159.5

Table 4: Maine Tons of Criteria Air Pollutant from On-Road Sources by Equipment Type

Vehicle Class	CO	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Heavy Duty Diesel Buses (School & Transit)	130.7	1.1	719.2	42.7	38.8	25.0	28.1
Heavy Duty Diesel Vehicles (HDDV) Class 2B	109.5	3.1	558.1	23.7	20.6	28.2	26.8
Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5	132.0	3.1	720.5	22.0	18.8	34.5	32.0
Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7	516.9	7.3	3186.4	106.7	94.9	108.1	142.3
Heavy Duty Diesel Vehicles (HDDV) Class 8A & 8B	3914.8	26.9	25773.6	563.0	490.6	510.2	627.2
Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV)	12224.7	21.5	2681.0	50.6	37.0	78.4	706.9
Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT)	32.2	0.1	37.1	4.6	4.0	3.7	18.4
Light Duty Diesel Vehicles (LDDV)	24.1	0.1	25.2	3.9	3.4	1.6	9.9
Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5)	114763.4	371.3	5923.1	114.9	63.2	302.3	5826.0
Light Duty Gasoline Trucks 3 & 4 (M6) = LDGT2 (M5)	53664.4	121.4	2564.0	48.3	28.1	136.9	3267.3
Light Duty Gasoline Vehicles (LDGV)	224582.4	910.8	12403.3	256.6	133.7	573.3	12240.3
Motorcycles (MC)	862.6	0.7	95.3	2.2	1.3	1.8	112.4

Figure 5: Relative Percentage of Criteria Air Pollutants from On-Road Mobile Sources

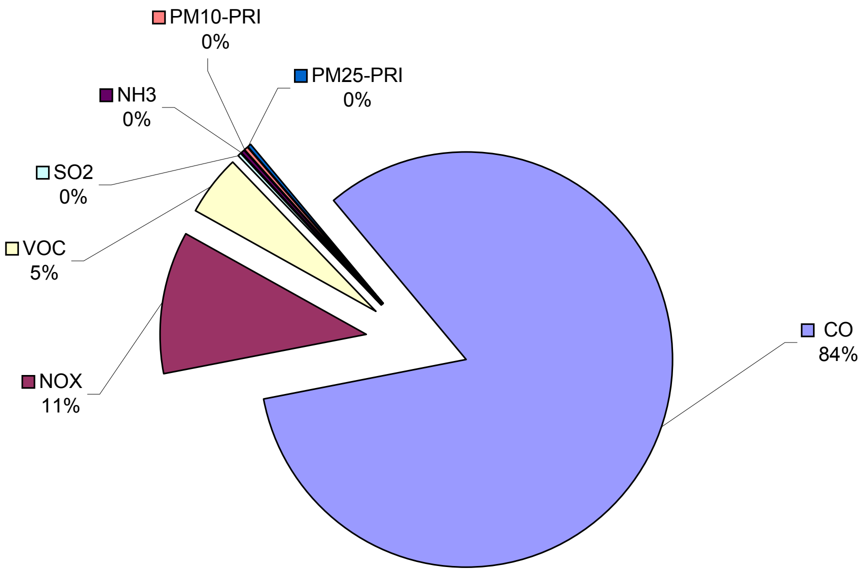
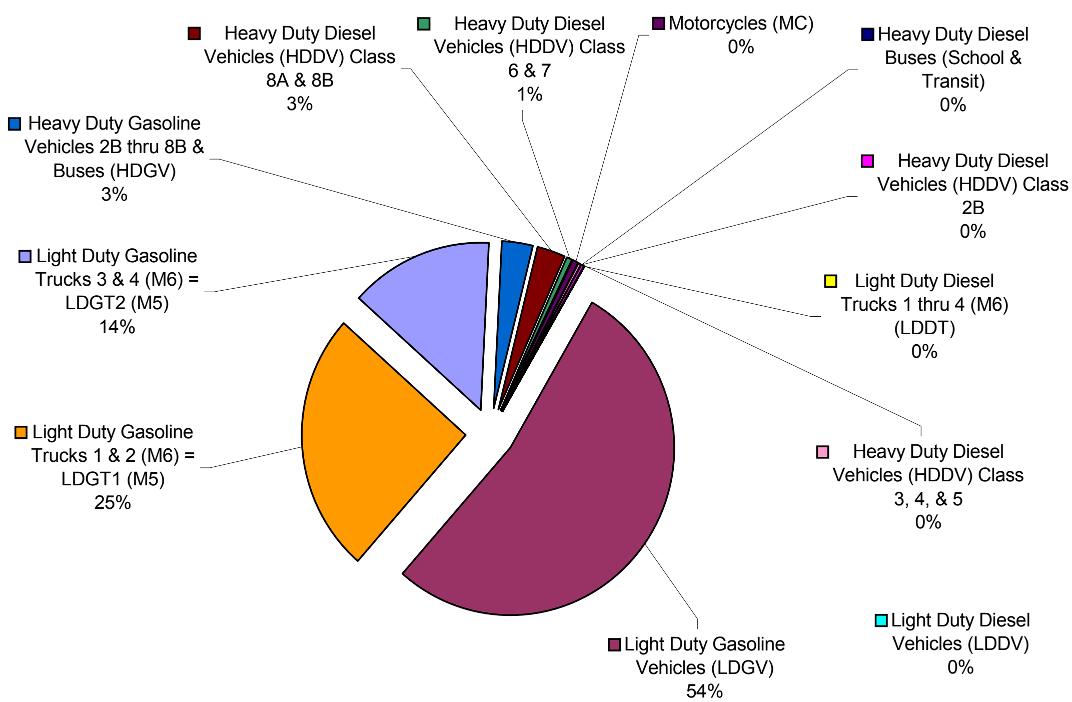


Figure 6: Relative Statewide VOC Emissions by Vehicle Type



3.2 OFF-ROAD MOBLILE EMISSIONS

3.2.1 Introduction to Other Nonroad Engines and Vehicles

The Off-Road Mobile Source (also referred to as Nonroad) category includes a diverse collection of equipment ranging from lawnmowers and chain saws, to recreational equipment, farm equipment and construction machinery. Commercial Marine Vessels, Aircraft and Railroads are also included in the Nonroad Category and are discussed separately in this section.

3.2.2 Estimation Methods for Categories in NONROAD2004 Model

Nonroad equipment emissions for 2002 were calculated by Pechan as part of the MANE-VU inventory process. Pechan used EPA's Draft NONROAD2004 model. The model has the capacity to estimate emissions for more than eighty (80) basic types and about two-hundred and sixty (260) specific types of nonroad equipment, excluding aircraft, commercial marine, and railroad locomotive sources. Fuel-types included gasoline, diesel, compressed natural gas (CNG), and liquefied petroleum gas (LPG).

To facilitate analysis and reporting, the equipment types were grouped into thirteen equipment categories.

Agricultural	Airport Ground Support
Commercial	Construction and Mining
Diesel Nonroad	Gasoline 2-stroke
Gasoline 4-stroke	Industrial
Lawn and Garden	Logging
LPG Nonroad	Recreational
Underground Mining	

3.2.3 Summary of Nonroad Emissions in Maine

Because the Nonroad category includes such a diversity of equipment and engine types, no one equipment category was the major source of all pollutants.

Construction equipment was the primary emitter of NOX and SO_2. This is most likely due to the predominance of diesel equipment in this category. Recreational equipment, including ATVs, personal watercraft, and snowmobiles, was the primary emitter of ammonia and VOCs, and a close second in carbon monoxide, PM-10 and PM-2.5 emissions. This category is rife with small gasoline engines that often provide incomplete combustion. Lawn and garden equipment led in carbon monoxide emissions and gasoline, two-stroke engines led in both categories of PM emissions.

Gasoline, two-stroke engines, where the oil is mixed and burned with the gasoline, emit a high amount of particulate matter and other air pollutants. As cleaner running, gasoline, four-stroke engines come into the marketplace and replace older two-stroke models, emissions are expected to drop for this category. Four-stroke engines emitted far less pollutants, as demonstrated in Table 5 (emissions expressed in tons per year).

Table 5: Comparison of Emissions from Two-Stroke and Four-Stroke Gasoline Engines

Nonroad Category	CO	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Gasoline 2-Stroke	14,086.4	1.3	159.0	382.7	352.1	9.3	7,143.6
Gasoline 4-Stroke	6,066.6	0.5	265.2	2.6	2.4	4.6	395.5

Figure 7: Percentage of Criteria Pollutants that made up the NONROAD Model Calculated Emissions in Maine in 2002

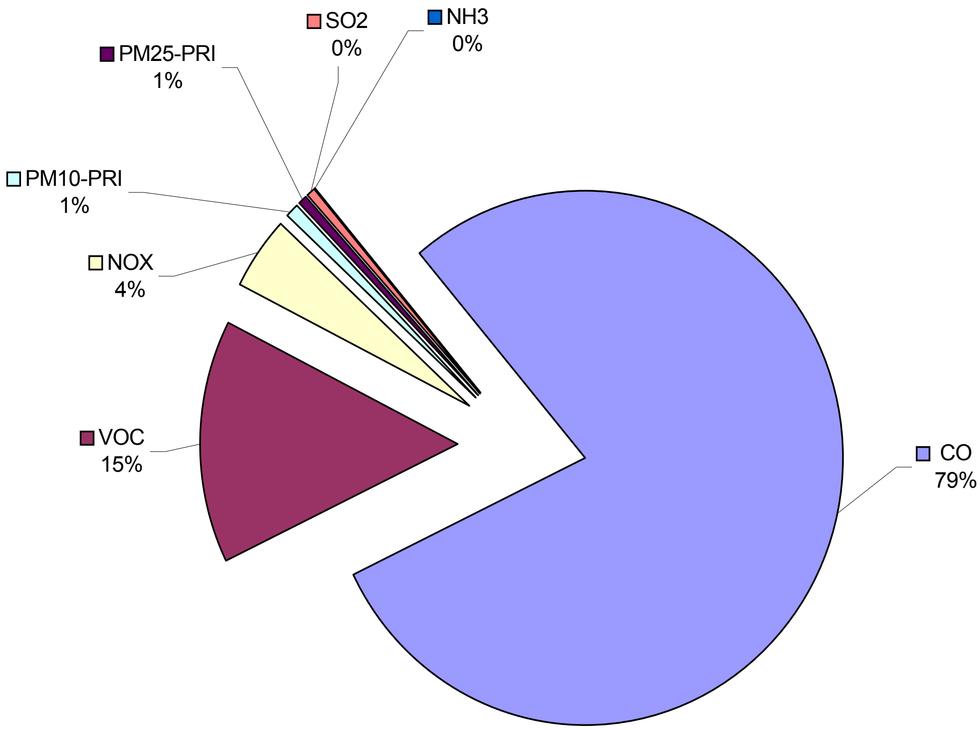


Table 6: Criteria Pollutant Emissions in Maine by Nonroad Category (Tons of Pollutant)

Nonroad Category	CO	CO2	NH3	NOX	PM10-PRI	PM25-PRI	SO2	VOC
Agricultural Equipment	892.59	52,990.99	0.44	711.08	87.79	80.77	79.66	102.50
Airport Ground Support Equipment	6.30	859.89	0.01	10.55	0.88	0.81	1.31	1.00
Commercial Equipment	17,855.00	61,688.17	0.66	535.55	50.04	46.07	40.92	706.33
Construction and Mining Equipment	4,010.67	229,095.97	1.89	2,720.28	258.67	237.98	343.63	478.47
Diesel Nonroad Equipment	48.99	18,588.46	0.15	237.13	8.37	7.70	28.48	11.98
Gasoline 2-Stroke	14,086.40	76,113.39	1.26	159.01	382.67	352.06	9.33	7,143.58
Gasoline 4-Stroke	6,066.57	36,984.46	0.49	265.22	2.56	2.35	4.57	395.55
Industrial Equipment	7,306.20	117,559.76	0.48	1,716.75	57.90	53.69	77.55	438.08
Lawn and Garden Equipment	46,822.18	101,897.18	1.38	525.98	100.77	92.71	29.03	3,181.79
Logging Equipment	5,000.52	112,361.98	0.98	1,160.53	120.81	111.14	159.41	802.33
LPG Nonroad Equipment	0.22	3.13	0.00	0.06	0.00	0.00	0.00	0.02
Recreational Equipment	44,156.08	240,744.88	3.67	245.28	291.44	268.12	33.67	14,282.38
Underground Mining Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7: Tons of Criteria Pollutants from Nonroad Emissions in Maine, By County

Pollutant	Androscoggin	Aroostook	Cumberland	Franklin	Hancock	Kennebec	Knox	Lincoln	Oxford	Penobscot	Piscataquis	Sagadahoc	Somerset	Waldo	Washington	York
CO	6,438	7,223	30,255	5,484	8,785	9,364	12,560	6,503	5,976	10,419	8,154	4,520	6,053	4,969	7,508	12,041
VOC	481	1,210	2,853	1,518	2,295	1,160	2,662	1,766	1,342	1,324	2,824	1,344	1,404	1,400	2,336	1,625
NOX	473	820	1,920	257	307	604	330	150	401	990	223	116	422	211	242	822
PM10-PRI	40	105	215	53	96	70	110	59	59	108	98	43	69	52	93	93
PM25-PRI	37	97	198	48	89	65	101	54	54	99	90	39	63	48	86	85
SO2	39	91	188	26	25	59	25	16	42	102	22	13	44	22	20	73
NH3	0.4	0.8	1.9	0.5	0.7	0.6	0.8	0.5	0.6	0.9	0.8	0.4	0.6	0.5	0.7	0.9
CO2	43,962	82,477	197,309	42,503	54,208	65,920	61,835	37,668	51,740	98,439	56,280	29,284	53,267	36,883	49,146	87,967

3.3 AIRCRAFT MOBILE SOURCE EMISSIONS

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3.3.1 Emission Estimates for the June 1, 2004 NEI Submittal

Maine DEP inadvertently left out the emission estimates for aircraft emissions from the June 1, 2004 NEI submittal. This was raised to Maine DEP's attention during the MANE-VU quality assurance review.

3.3.2 Emission Estimates Subsequent to the June 1, 2004 NEI Submittal

Upon realizing that Maine DEP had failed to file emission estimates for this source category, Maine DEP undertook the following calculations for VOC, NOx andSO_2, based on the MANE-VU calculation methodology sheet, which is quoted extensively below.

Methodology

For the purposes of emission estimation, aircraft can be categorized broadly into four major groups: commercial, general aviation, air taxi, and military aircraft. Commercial aviation includes all aircraft used for scheduled passenger transportation, freight, or both. Air taxis are used for similar operations but are generally smaller and operate on a more limited basis than commercial carriers. The general aviation group includes all non-military rotary wing (helicopters) and most fixed wing aircraft used for recreational flying, business and personal transportation, and various other activities. Military aircraft can be categorized as all aircraft used for national defense and military support. The SCCs for this category are assigned as follows:

Source Category	SCC
Commercial Aircraft	2275020000
General Aviation	2275050000
Air Taxis	2275060000
Military	2275001000

Aircraft emissions were calculated differently for each aviation group defined above. In each case, LTO (landing and take-off) cycles served as the sole source of activity data used in the estimation process. Operational data for all aircraft groups at FAA-towered airports, federally-contracted towered airports, nonfederal towered airports, and many non-towered airports was obtained using the FAA Terminal Area Forecast System (FAA TAF). Additional data (departures by aircraft model) for airports which support commercial aircraft activity (Bangor International and Portland Jetport only) were obtained from the U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information. Finally, data regarding military aircraft operations at Brunswick Naval Air Station (BNAS) were obtained directly from Naval personnel.

Emissions from general aviation, air taxi, and military aircraft were estimated by multiplying the number of LTO cycles by composite emission factors listed in *Procedures of Emission Inventory Preparation, Volume IV: Mobile Sources*. Correction values for each aircraft type were applied to total HC to obtain an estimation of VOC.

To quantify emissions from commercial aircraft at Portland International Jetport and Bangor International Airport, LTO and aircraft data was entered into the FAA Aircraft Engine Emission Database (FAEED). Default values for Time-In-Mode and engine type were selected for each aircraft type. Emissions from aircraft not included in FAEED were calculated by generating composite emission factors from the commercial fleet mix at each airport. Again, correction values were applied to total HC to obtain an estimation of VOC.

Table 3.3.2-A: Aircraft Emission Factors

EMISSION FACTOR (LB PER LTO CYCLE)			
TYPE	**SO2**	**NOX**	**VOC**
Air Taxis	0.015	0.158	1.223
Commercial Aircraft			
General Aviation	0.010	0.065	0.382
Military Aircraft	0.015	0.158	1.363

The 2002 values were extrapolated from the 1999 and the projection 2005 emissions. (National Bureau of Labor Standards growth factors were used.)

References

1. *Procedures of Emission Inventory Preparation, Volume IV: Mobile Sources.* EPA-450/4-81-026d (Revised), U.S. EPA, OAQPS, 1992.

2. FAA Aircraft Engine Emission Database (FAEED).

3.4 COMMERCIAL MARINE VESSELS – PORT AND UNDERWAY EMISSIONS

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3.4.1 Emission Estimates for the June 1, 2004 NEI Submittal

Maine DEP inadvertently left out the emission estimates for Commercial Marine Vessels from the June 1, 2004 State NEI submittal. This was raised to Maine DEP's attention during the MANE-VU quality assurance review.

3.4.2 Emission Estimates Subsequent to the June 1, 2004 NEI Submittal

Upon realizing that Maine DEP had failed to file emission estimates for this source category, Maine DEP undertook the following calculations.

Methodology

Marine activity is classified in two ways, recreational and commercial (including military). Recreational boating generally includes vessels less than 100 ft. in length with the majority being less than 30 ft. These are powered by both inboard and outboard engines and may be either gasoline or diesel. Emissions from recreational watercraft are currently accounted for in the EPA NONROAD model; and, therefore, are accounted for in the Nonroad emissions portion of the 2002 NEI. For the purposes of these calculations, any vessel greater than 18 ft. in length will be considered a steamship using residual oil; vessels less than 18 ft. in length a portion of vessels greater than 18 ft. in length will be considered inboard vessels using diesel.

Commercial marine activity includes both steam (residual) and diesel-powered vessels. Estimates for both categories were calculated based on the fuel sales methodology described in Volume IV of "Procedures for Emission Inventory Preparation, Mobile Sources (1989)." Data on vessel draft were obtained from the US Army Corps of Engineers Navigational Data Center, *2002 Waterborne Commerce of the United States,* Part 1, Atlantic Coast. Statewide marine fuel usage came from the US Department of Energy, Energy Information Administration, Fuel Oil and Kerosene Sales, Vessel Bunkering, 2002 (Table 23).

Emissions are divided into port and underway emissions. SCC 228002100 is for port emissions from commercial marine vessels using diesel fuel. SCC 228003100 is for port emissions from commercial marine vessels using residual fuel. SCC 228002200 is for underway emissions from commercial marine vessels using diesel fuel. SCC 228003200 is for underway emissions from commercial marine vessels using residual fuel.

The following calculations were used to apportion statewide vessel bunkering fuel sales to the county/port level. Port and underway emissions are disaggregated using the assumption that 75% of distillate fuel and 25% of residual fuel are consumed within the port area and the remaining emissions occur while the ship is underway.

$A_R = V^1 / V^2$

$A_D = V^3 + (2 \times V^1) / (V^4 + (2 \times V^2))$

$Q_{RP} = 0.25 \times A_R \times S_R$
$Q_{DP} = 0.75 \times A_D \times S_D$

$Q_{RU} = 0.75 \times A_R \times S_R$
$Q_{DU} = 0.25 \times A_D \times S_D$

$E_{2280003100} = (Q_{RP} \times EF_S)$
$E_{2280002100} = (Q_{DP} \times EF_M)$
$E_{2280003200} = (Q_{RU} \times EF_S)$
$E_{2280002100} = (Q_{DU} \times EF_M)$

Where:

V^1 = Vessels in port with draft greater than or equal to18 ft
V^2 = Vessels using all ports within state with draft greater than or equal to 18 ft
V^3 = Vessels in port with draft less than 18 ft
V^4 = Vessels using all ports within state with draft less than 18 ft

A_R = Apportioning factor for residual fuel sold in port
A_D = Apportioning factor for distillate fuel sold in port

S_R = Total quantity of residual oil sold in State for marine use
S_D = Total quantity of distillate oil sold in State for marine use

Q_{RP} = Total quantity of residual oil used in port
Q_{DP} = Total quantity of distillate oil used in port
Q_{RU} = Total quantity of residual oil used while underway
Q_{DU} = Total quantity of distillate oil used while underway

EF_S = Steamship (residual) emission factor for pollutant Y
EF_M = Motorship (distillate) emission factor for pollutant Y

$E_{2280002100}$ = Port emissions from Marine Diesel vessels
$E_{2280002200}$ = Underway emissions from Marine Diesel vessels
$E_{2280003100}$ = Port emissions from Steamships (residual)
$E_{2280003200}$ = Underway emissions from Steamships (residual)

Emission Factors

Emission factors for criteria pollutants and hazardous air pollutants for diesel and residual fuels were obtained from the 1999 National Emissions Inventory documentation and earlier cited documentation. Fuel sulfur concentrations were assumed to be 0.25% for diesel fuel and 5% for residual fuel. For diesel fuel, the PM_{10} emission factor was derived from EPA's top down emission estimates and the national fuel data for 2000. $PM_{2.5}$ emissions were estimated by using the assumption that 92% of PM_{10} is $PM_{2.5}$. For the most part, HAPS for diesel emissions were obtained using speciation of VOC, PM_{10} or $PM_{2.5}$ emission estimates. HAPS for residual fuels were obtain from boiler emission factors from the ICCR program.

Table 3.4.2-A: Criteria Pollutant Emission Factors (lbs/1000 gal)

Fuel	VOC	NOx	PM10	PM2.5	CO	SO2	Pb
Steamship (residual)	1.27	54.45	25.8	23.74	3.7	7.95	1.54E-03
Marine Diesel	50	270	40.66	37.4	110	27	1.3E-03

Table 3.4.2-B: Diesel-powered Vessel Speciation Profiles

Pollutant	VOC Speciation Profile
Acetaldehyde	0.074298
Acrolein	0.0035
Benzene	0.020344
Ethylbenzene	0.0020
Formaldehyde	0.1496
n-Hexane	0.0055
Propionaldehyde	0.0061
Styrene	0.0021
Toluene	0.0032
Xylene	0.0048
2,2,4-Trimethylpentane	0.0004
Pollutant	**PM10 Speciation Profile**
Chromium	3.27E-06
Manganese	2.04E-06
Nickel	6.55E-06
Pollutant	**PM2.5 Speciation Profile**
Benzo(a)anthracene	0.00004
Benzo(a)pyrene	0.000013
Benzo(b)fluoranthene	0.000011
Benzo(k)fluoranthene	0.000011
Chrysene	0.000007
Acenaphthene	0.000024
Acenaphthylene	0.000037
Anthracene	0.000037
Benzo(ghi)perylene	0.000009
Fluoranthene	0.000022
Fluorene	0.000049
Naphthalene	0.001401
Phenanthrene	0.000056
Pyrene	0.000039

Table 3.4.2-C: Steam-powered Vessel (Residual) HAP Emission Factors

Pollutant	Emission Factor (lbs/1000 gal)
Acetaldyhyde	4.9E-03
Benzene	2.1E-04
Formaldehyde	3.36E-02
POM as 7-PAH	1.16E-05
POM as 16-PAH	1.18E-03
Beryllium	2.8E-05
Cadmium	3.92E-04
Chromium (trivalent)	8.4E-04 * 0.66
Chromium (hexavalent)	8.4E-04 * 0.34
Lead	1.54E-03
Manganese	2.94E-03
Nickel	8.4E-02
Selenium	6.86E-04

Sample Calculation

V_1 = 933 Vessels in Cumberland County ports greater than or equal to 18 ft in length
V_2 = 1,974 Total Vessels in Maine ports greater than or equal to 18 ft. in length
V_3 = 35,698 Vessels in Cumberland County ports less than 18 ft. in length
V_4 = 90,844 Vessels in Maine ports less than 18 ft. in length

A_D = 35,698 + (2 x 993) / (90,844 + (2 x 1,974))
= 0.3974

Q_{DP}= 0.75 x 0.3974 x 8,669,000 gal distillate
= 2,583,770 gal

$E_{2280002100(VOC)}$ = (2,583.77 x 50)/2000
= 64.59 Tons VOC/year
= 64.59 Tons x 0.25/91days
= 0.177 Tpswd

Areas for Improvement

EPA has developed a improved emissions methodology for commercial marine vessels. Maine would prefer to use this model, however, the model is data intensive and will require considerable effort.

References

1. *Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*. United States Environmental Protection Agency (July, 1989). ftp://ftp.epa.gov/pub/EmisInventory/finalnei99ver3/criteria/documentation/nonroad/99nonroad_vol2_cmv.pdf

2. *1999 National Emissions Inventory; Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components;* Volume I: Methodology, Appendix B: Commercial Marine Vessels Emission Estimation Methodology (October 2003). ftp://ftp.epa.gov/pub/EmisInventory/finalnei99ver3/criteria/documentation/nonroad/99nonroad_vol1_oct2003.pdf

3. *Emission Inventory Improvement Program, Volume 9: Particulate Emissions: Commercial Marine Vessels.* United States Environmental Protection Agency (February, 2003). http://www.epa.gov/ttn/chief/eiip/techreport/volume09/commrnves.pdf

4. *Draft Regulatory Support Document: "Control of Emissions from Compression-Ignition Marine Diesel Engines At or Above 30 Liters per Cylinder"* United States Environmental Protection Agency, (EPA420-D-02-002, April 2002). http://www.epa.gov/otaq/regs/nonroad/marine/ci/d02002.pdf

5. *2002 Waterborne Commerce of the United States Part 1 : Atlantic Coast*. US Army Corps of Engineers Navigational Data Center. http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcusatl02.pdf

6. Fuel Oil and Kerosene Sales, 2002. US Department of Energy Information Administration. http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/fuel_oil_and_kerosene_sales/current/pdf/table23.pdf

3.5 DIESEL LOCOMOTIVE EMISSIONS, LINE HAUL AND YARD ENGINES

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3.5.1 Emission Estimates for the June 1, 2004 NEI Submittal

Maine DEP inadvertently left out the emission estimates from locomotive activities in the June 1, 2004 State NEI submittal. This was brought to Maine DEP's attention during the MANE-VU quality assurance review.

3.5.2 Emission Estimates Subsequent to the June 1, 2004 NEI Submittal

Subsequent to the initial MANE-VU quality assurance check, Maine DEP conducted preliminary calculations for PM, SOx, NOx, CO, and VOC using the protocols contained in "Locomotive Mobile Source Category Calculation Methodology Sheet", which was prepared by the MANE-VU inventory team. The methodology is available on the Mid-Atlantic Regional Air Management Association (MARAMA) website at http://www.marama.org/visibility/Calculation_Sheets/Locomotive_new.doc.

Methodology

This section describes the methodology to be used to calculate emissions from locomotive activities based on the state data that was available prior to October 1, 2004. The emission estimates in this category are for emissions from SCC 2285002005 (Locomotive - Diesel - Line Haul), and SCC 2285002010 (Locomotive - Diesel - Yard Engines).

Railroad locomotives used in the United States are primarily of two types: electric and diesel-electric. Electric locomotives are powered by electricity generated at stationary power plants. Emissions are produced only at the electrical generation plant, which is considered a point source and therefore not included here in the area source inventory. Diesel-electric locomotives, on the other hand, use a diesel engine and an alternator or generator to produce the electricity required to power its traction motors. Emissions produced by these diesel engines are of interest in emission inventory development. Other sources of emissions from railroad operations include the small gasoline and diesel engines used on refrigerated and heated rail cars. These engines are thermostatically controlled, working independently of train motive power, and fall in the category of nonroad equipment.

Locomotives can perform two different types of operations: Line Haul (SCC: 2285002005) and Yard (SCC: 2285002010). Line haul locomotives, which perform the line haul operations, generally travel between distant locations, such as from one city to another. Yard locomotives, which perform yard operations, are primarily responsible for moving railcars within a particular railway yard.

Annual fuel use data was obtained from the Department of Energy website; fuel oil and kerosene sales data for transportation use (http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/fuel_oil_and_kerosene_sales/current/pdf/table11.pdf). A mailing requesting information on fuel use and number of yard locomotives was also sent to the railroads operating in Maine. As of October 1, 2004, only two rail lines had responded. One rail line is based out of Canada and purchases its locomotive fuel in Canada, thus the fuel used by this company is not tracked on the DOE sales report. The amount of fuel used by this company was added to the statewide total. The Canadian rail line's fuel use was added to the state total instead of being allocated to the county it operates in because the fuel use from this rail company was higher than the DOE state total and would have shown disproportionate locomotive emissions from the county they operate in.

The number of track miles in each county was obtained using the Maine GIS/DOT database. The total fuel was allocated based on miles of track in each county.

The following equations were used to compute the amount of fuel consumed by the railroads in each County.

$$G_{CTY} = \frac{M_{CTY}}{M_{ST}} * G_{ST}$$

Where:

M_{CTY} = mileage of company tracks in the county
M_{ST} = mileage of company tracks in the state
G_{ST} = amount of total fuel used in gallons by railroads in the state
G_{CTY} = amount of total fuel used in gallons by railroads in the county

The following equation was used to calculate the emissions for line haul locomotives operating in a county.

$$E_{LH-i-CTY\,j} = \frac{G_{CTY\,j} \times EF_{LH}}{2000(\text{lbs/ton}) \times 365(\text{days/yr})}$$

Where:

$E_{LH-i-CTY\,j}$ = Emissions from line haul railroad locomotives for pollutant i in County j (tons/ day)
$G_{CTY\,j}$ = Total amount of fuel consumed railroads in the county (gallons/year)
EF_{LH} = Line haul locomotive emission factor for a given pollutant (lbs/1000 gallons)

Table 3.5.2-A: Line Haul Locomotive Emission Factors

	Emission Factor (lbs/1000 gal of fuel used)
HC	38.22
*VOC	(38.22 x 1.053) = 40.22
NOx	658.41
CO	69.25
SO_2	36
PM_{10}	16.65
$PM_{2.5}$	(90% of PM_{10}) = 14.99

The emission factor information presented in the table above was obtained from Sierra Research Inc. "Revised Inventory Guidance for Locomotives Emissions" (http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf). These emission factors consider the fact that no emission controls are required for locomotive engines.[6] Since we have not received data from all the rail companies, emissions from yard locomotives have not been calculated at this time. These emission estimates will be preformed if the Maine DEP receives the requested information.

Sample Calculations for Cumberland County, ME (based on state data)

Line Haul Emission Estimate

Track miles in Cumberland county/track miles in Maine x (gallons of fuel used in by locomotives in state) = gallons of fuel used by locomotives in Cumberland county

170.6 miles/1698.7miles x 775327 gallons = 77884 gallons used by locomotives in Cumberland county

VOC Emissions from line haul locomotives in Cumberland County:

$$EM_{VOC} = \frac{77884 \text{ gal / yr x } 38.22 \text{ lbs. HC / 1000 gal x}1.053 \text{ lb VOC/Lb HC}}{(2000 \text{ lbs. per ton}) * (365 \text{ days per year})}$$

EM_{VOC} = 0.004 tons $_{VOC}$ / day

NOx Emissions from line haul locomotives in Cumberland County:

$$EM_{NOX} = \frac{77884 \text{ gal / yr x } 658.41 \text{ lbs. } NO_X \text{ / 1000 gal}}{(2000 \text{ lbs. per ton}) * (365 \text{ days per year})}$$

EM_{NOX} = 0.07 tons Nox / day

CO Emissions from line haul locomotives in Cumberland County:

$$EM_{CO} = \frac{77884 \text{ gal / yr x } 69.25 \text{ lbs. CO / 1000 gal}}{(2000 \text{ lbs. per ton}) * (365 \text{ days per year})}$$

EM_{CO} = 0.007 tons $_{VOC}$ / day

Areas for Improvement

As discussed above the following factors increase the uncertainty of these calculations and should be the target of future inventory improvements:

1. National fuel use data was used instead of local data. Additional Rail lines purchasing their fuel in Canada will not be included in the National fuel use data, and therefore emissions will be underestimated. Calculations should be revised once we have obtained fuel use from the specific rail companies operating in Maine.
2. Emissions were not allocated per rail company.
3. Fuel and emissions from yard locomotives were not taken into account.
4. National estimates for mix of operations were used rather than location specific value.

[6] More information regarding locomotive emission standards is available in EPA's Locomotive Emission Standards document available at: www.epa.gov/otaq/regs/nonroad/locomotv/frm/locorsd.pdf.

References

1. Sierra Research Inc., *Revised Inventory Guidance for Locomotive Emissions(June 2004)* http://www.metro4-sesarm.org/pubs/railroad/FinalGuidance.pdf

2. E.H. Pechan and Associates, Inc., PowerPoint presentation, *Nonroad Source Inventory Development, Aircraft, Locomotives, and Commercial Marine Vessels (CMV).*

3. Emission Inventory Improvement Program, EIIP Document Series - Volume IX, Particulate Emissions, Locomotives http://www.epa.gov/ttn/chief/eiip/techreport/volume09/locomotives.pdf

4. Maryland Department of the Environment, *Calculation Methodologies (draft)*, June 2002.

5. US Environmental Protection Agency, OAQPS, *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations, June 2003.*

6. US Environmental Protection Agency, Office of Mobile Sources, *Emission Factors for Locomotives, Technical Highlights,* December 1997.

7. Additional Information and Guidance is available for calculating Emissions from Locomotives from:
   - EPA Contact: Ms. Laurel M. Driver, Emission Factor and Inventory Group, E-mail: driver.laurel@epa.gov, Telephone: 919-541-2859
   - Additional Information on Locomotives: www.epa.gov/otaq/locomotv.htm
   - Emission Factor for Locomotives: www.epa.gov/otaq/regs/nonroad/locomotv/frm/42097051.pdf
   - Mobile Source Emission Inventory Guidance Document: www.epa.gov/otaq/invntory/r92009.pdf
   - NEI Methodology Description: www.epa.gov/ttn/chief/net/index.html#doc

3.6 FUGITIVE DUST FROM PAVED AND UNPAVED ROADS

Maine DEP contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

3.6.1 Emission Estimates for the June 1, 2004 NEI Submittal

Maine DEP inadvertently left out the emission estimates for fugitive dust from paved and unpaved roads from the June 1, 2004 State NEI submittal. This was raised to Maine DEP's attention during the MANE-VU quality assurance review.

3.6.2 Emission Estimates Subsequent to the June 1, 2004 NEI Submittal

Upon realizing that Maine DEP had failed to file emission estimates for this source category, Maine DEP undertook the following calculations.

Maine has calculated emissions estimates for fugitive dust from paved roads (SCC: 2294000000) and from unpaved roads (SCC: 2296000000) for the 2002 NEI. Maine has developed its own methodology for estimating emissions and conducted its own calculations for this category.

Maine 2002 Methodology

Methodology derived in part from “Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version.” Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

In its 2002 NEI Methodology, EPA provided emission factors for PM-10 and PM-2.5 for fugitive dust emissions from paved and unpaved roads.[7] These monthly emission factors are expressed in g/VMT (grams of PM per vehicle mile traveled) for each of the 12 Federal Functional Class roadway designations. 2002 Actual Daily VMT for each Federal Functional Class is used by Maine DEP to calculate on-road emissions using the MOBILE6.2 model. Maine was then left with two problems to overcome to perform these calculations:

1. Apportioning total VMT to paved and unpaved roads; and
2. Including fugitive dust calculations for private roads.

1. Apportioning Total VMT to Paved and Unpaved Roads

Using ArcGIS 9.0 and the geographic information (GIS) layer provided by the Maine Department of Transportation (DOT) for Maine roads,[8] Maine DEP was able to calculate the total number of miles by functional class for paved and unpaved roads in each county. Each road segment in the GIS layer had a data element named “Surface Type.” Maine DOT tags all road segments with one of eight surface types: Flexible, High Flexible, Unimproved, Gravel, Other, Port Cement Comp, and Unknown. After speaking with a DOT official, it was determined that “Unimproved” and “Gravel” were the road surface types most likely to be unpaved while all others should be considered paved.[9] County Daily VMT was then apportioned to paved and unpaved categories based on the surface type and factored Annual Average Daily Traffic Volume (AADTV) for each Federal Functional Class. One glaring omission was that the GIS layer did not provide “Urban” and “Rural” designations with the Federal Functional Class descriptions, so it has been assumed by Maine DEP that the percent of unpaved (or paved) local roads applies to both “Urban Local” and “Rural Local” roads.

Because 2002 Actual Daily VMT was used, seasonal allocation factors provided by EPA from the National Acid Precipitation Assessment Program (NAPAP) Inventory were applied to the Daily VMT to develop Winter Daily VMT (for December, January and February); Spring Daily VMT (for March, April and May); Summer Daily VMT (for June, July and August); and Fall Daily VMT (for September, October and November).

T11 – Paved and Unpaved Road VMT temporal allocation factors

RUR_URB	SEASON	VMTFRAC
RURAL	WINTER	0.2199
RURAL	SPRING	0.2403
RURAL	SUMMER	0.2845
RURAL	FALL	0.2553

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[7] Appendix C1, “Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version.” Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

[8] The Maine Roads GIS layer depicts roads of Maine, as provided by Maine DOT. It is a combination of their current “pubroads” database (all the public roads in Maine) and an older private roads database (not necessarily up to date). This layer was last updated in September 2003.

[9] E-mail correspondence with Peter Coughlan, Director, Division of Community Services, Maine Dept. of Transportation, January 12, 2005.

T11 – Paved and Unpaved Road VMT temporal allocation factors		
RUR_URB	**SEASON**	**VMTFRAC**
URBAN	WINTER	0.236
URBAN	SPRING	0.2547
URBAN	SUMMER	0.264
URBAN	FALL	0.2453

Example Calculation for Seasonal VMT Allocation
Cumberland County

$$(2002 \text{ Actual Daily } VMT_{\text{Surface - Fed Func Class}} \text{ x Seasonal VMT Fraction X } 365) / \text{Days in Season} = \text{Seasonal Daily } VMT_{\text{Surface - Fed Func Class}}$$

Allocating Actual Daily VMT for Cumberland County, Rural Local Paved Roads in Summer

$$(436{,}960\ VMT_{\text{Paved-Rural-Local}} \text{ x } 0.2845 \text{ x } 365)/(30+31+31) = 493{,}206\ VMT_{\text{Paved - Rural-Local-Summer}}$$

2. Including fugitive dust calculations for private roads

Private roads abound in Maine whether used by paper companies through the vast Maine woods to bring out timber or camp roads used to access lakes and hunting camps. Also, many municipalities, faced with suburban sprawl, have refused to add to streets in many new housing developments to the public roads list. EPA's methodology only accounts from fugitive dust from public ways. Maine DEP felt the methodology was lacking and developed a way to add private road VMT into the mix.

Using the Maine Roads GIS layer, Maine DEP was able to calculate the miles of private road in each county in Maine. Next, several assumptions were made:

a) After contacting a representative of the Maine Department of Transportation,[10] Maine DEP estimates that 80% of private roads are unpaved and 20% are paved;
b) Private roads are assumed to be similar to Rural, Local roads in their use and characteristics for purposes of assigning a Federal Functional Classification; and
c) The volume category (vehicles per day per mile) is less than 50 vehicles per day, therefore, the Assumed ADTV is 5.

Using the formula provided by EPA in the unpaved roads methodology, a Daily VMT for private paved and unpaved roads was calculated.

$$\text{Daily } VMT_{\text{Private-SurfaceType-County}} = \text{ADTV x Private } Miles_{\text{County}} \text{ x } \%_{\text{SurfaceType}}$$

Example Calculation for Unpaved Private Road VMT Calculation
Cumberland County

$$\text{Daily } VMT_{\text{Private-Unpaved-Cumberland}} = 5 \text{ x } 1{,}127 \text{ miles x } 0.80 = 4{,}508 \text{ vehicles/mile/day}$$

Finally, seasonal allocation factors were applied to the private road daily VMT, as was done to the public road VMT (see previous section).

[10] Peter Coughlan, previously cited e-mail, January 2005.

<u>Sample Calculation</u>

The seasonal VMT values were multiplied by the number of days in the month and the monthly emission factor for each Federal Functional Class to estimate emissions by month. EPA emission factors express PM emissions in grams/VMT. The sum of all twelve month emissions is the annual emissions per year.

Example Calculation
PM-10 PRI Emissions from Cumberland County, Paved, Rural Local Roads for June

$$\text{PM-10 PRI EM}_{\text{County-Surface-FedFunc-Month}} = \text{Seasonal Daily VMT}_{\text{County-Surface-FedFunc-Month}} \times \text{Days in Month} \times \text{EF}_{\text{Surface-FedFunc-Month}}$$

$$\text{PM10EM}_{\text{Cumberland-Paved-Rural,Local-June}} = 493{,}206 \times 30 \times 3.1185986$$

$$\text{PM10EM}_{\text{Cumberland-Paved-Rural,Local-June}} = 46{,}143{,}346.23 \text{ grams PM-10 PRI}$$

$$= 50.86 \text{ tons PM-10 PRI in June}$$

<u>Controls for Paved and Unpaved Roads</u>

Controls for both paved and unpaved roads are determined by non-attainment classification. Maine has no non-attainment areas for PM-10, so no controls were assumed.

4. MAINE'S 2002 BIOGENIC SOURCE INVENTORY

The Consolidated Emissions Reporting Rule (CERR) requires states to submit county-level biogenic inventories for 2002. This requirement is difficult to meet for many states. County-level estimates are usually not useful for air quality modeling purposesand models, such as BEIS2 or BEIS3, generate grid-based biogenic emissions.

Therefore, EPA's Emissions Factors & Inventory Group (EFIG) graciously agreed to provide estimated 2002 county-level biogenic emissions using BEIS3 for the entire country. Maine reviewed the estimates provided by EFIG in early 2004 and then in accordance with EPA instructions, on May 27, 2004, Maine e-mailed Phil Lorang at the U.S. EPA (lorang.phil@epa.gov), accepting these BEIS3.12 estimates for Maine's CERR submittal. EPA notified the state that sending this e-mail fulfilled the biogenic CERR submittal requirement. EPA does not anticipate that these emission values will be used in modeling efforts by EPA or other groups. Rather, the estimates can be used to check biogenic emissions calculated by others as part of modeling efforts.

The approach EPA used to create the county-total, annual 2002 biogenic emission estimates is as follows:

A. EPA ran the BEIS3.12 model via the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system, using the following data:
   (1) 2001 annual meteorology
   (2) EPA's recently revised BEIS3.12 emission factors file
   (3) BELD3 land use data (1-km original data aggregated to 36-km grid).

B. EPA ran the SMOKE post processing summation of county-total emissions, calculated from 36-km gridded emissions using the "land area" spatial surrogate. This means that when calculating the county-total numbers, the 36-km gridded emissions were assumed to be uniformly distributed over the grid cell for purposes of mapping to the counties. Emissions were then summed for the year for each county.

   The emissions were calculated in short tons/year for the following CMAQ CB-IV model species: NO, ALD2, ETH, FORM, ISOP, OLE, PAR, TOL, XYL, NR, and TERPB.

C. The emissions were also calculated for total VOC mass as:

   VOC = ALD2 + ETH + FORM + ISOP + OLE + PAR + TOL + XYL + NR

5. AREA SOURCE INVENTORY

5.1 AREA SOURCE INTRODUCTION

5.1.1 Maine DEP Process Used to Generate Area Emission Estimates

The Maine DEP inventory team developed the 2002 area source emission estimates for selected source categories. The inventory development team used a process (depicted in the flowchart in Table 8), which consisted of the following steps.

1. Determine the appropriate calculation methodology. Methods are based on past experience, prior DEP calculations, EPA preliminary calculations, and guidance published by EPA and Regional Planning Organizations (RPOs).

2. Obtain the Excel workbook template developed by the inventory team, which provides format consistency to ease QA review and data extraction by an Access database.

3. Populate the spreadsheet with activity data obtained by the inventory specialists from the sources referenced in this document.

4. Populate the spreadsheet with emission factors obtained by the inventory specialists from the sources referenced in this document.

5. Construct formulas in the Excel workbook on the calculation sheets, using the guidance referenced in this document.

6. Run the formulas.

7. Link results on the “Calculation Sheets” to the “Results” worksheet within the workbook.

8. Develop a narrative of the calculation methodology in a Word document. Each narrative in turn was incorporated into this inventory narrative. Sources for the narrative text include: EPA Guidance, RPO Guidance, prior inventory narratives, and staff experience.

9. Each inventory team member reviews his or her work .

10. Place the preliminary draft copy of the Excel and Word files into an inventory pre-QA folder (H:\Air\Emissions Data\2002 NEI development\2 Rdy4QA ME 2002 Inv).

11. Another member of the inventory development team conducts a peer review of the emission methods and calculations for each 2002 source category.

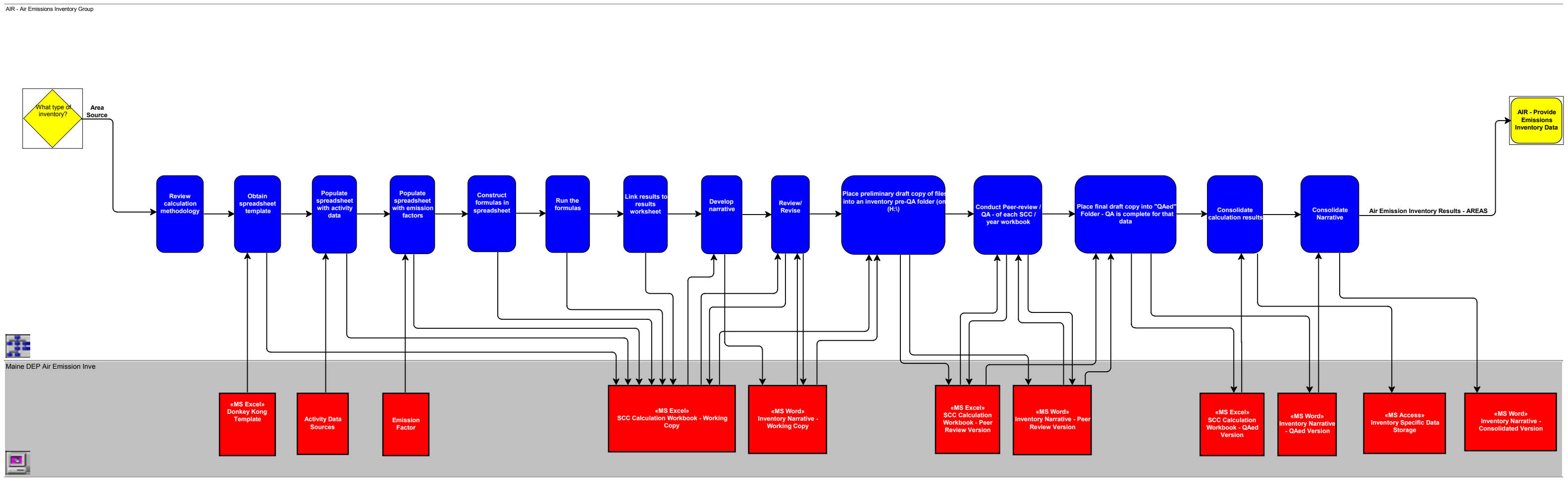
12. The reviewing team member corrects the calculations and methodology as necessary.

13. Place final draft copy of Excel workbook and narrative document into "QAed" folder ((H:\Air\Emissions Data\2002 NEI development\3 QAed ME 2002 Inv)

14. Extract calculation results from individual Excel workbooks for each source category and place into an Access Database which can then be used to transmit data to EPA in NIF3.0 format (H:\Air\Emissions Data\2002 NEI development\4 Deliverable ME 2002 Inv\2002NEI_ME_AR_V1.mdb)

15. Consolidate this inventory narrative of calculation methodologies from individual Word documents.

Table 8: Flowchart of Maine DEP Process Used to Generate Area Source Emission Estimates



5.1.2 Interface with EPA Area Source Calculations

EPA developed area source estimates for the states for several area source categories, based on nationally available activity data and “top-down” estimation procedures. These estimates were developed to aid the states in compiling an emissions inventory. Many of these calculations were made available to the states in May of 2004. For others, the activity data was not available prior to the State’s June 1, 2004 submittal deadline. Nonetheless, EPA intends to develop “top-down” emission estimates for several other source categories when the activity data becomes available. EPA will supplement the states June 1, 2004 CERR submission with these late area source category estimates. Finally, in some cases the activity data is so specific to individual states, the EPA could not attempt to calculate the emissions from these source categories. The categories that a specific emission source fall into, are detailed in EPA’s Final 2002 National Emission Inventory (NEI) Preparation Plan of August 10, 2004.

When Maine DEP did not have better calculation methods than EPA and/or local activity data, Maine DEP did not perform calculations and duplicate EPA efforts. Instead, Maine DEP used EPA’s emission estimates. In the following detailed narratives, Maine DEP explains who conducted the area source estimates, and to the extent possible, the procedures that were used to develop the emission estimates. In most cases, EPA has developed excellent documentation on its emission estimate procedures. However, in some cases, particularly estimates of HAPs calculated during MACT rule development prior to 1999, estimation procedures have not been published and are very difficult to obtain from EPA. In these cases, Maine DEP is unable to check EPA’s work and is concerned that the estimates are old and based on activity data that has likely changed since the emission estimates were first made.

5.1.3 Population Data Used for Area Sources – Quality and Confidence

Many of the area source calculations use population as the activity data. Population data is derived from census data. Activity data for county population was obtained from the U.S. Census and placed into a look-up table, to ensure that all area calculations using this data were based on the same data set. Maine DEP obtained the county population data from the U.S. Census, and we have a high level of confidence for this data. Table 9 contains the county level population data used to generate Maine’s preliminary 2002 calculations.

Table 9: Maine Population Data Used to Generate Select Area Source Emission Estimates for Maine’s preliminary 2002 Inventory

County	FIPS #	2002Population
Androscoggin	001	104,805
Aroostook	003	73,122
Cumberland	005	269,083
Franklin	007	29,683
Hancock	009	52,359
Kennebec	011	118,244
Knox	013	40,477
Lincoln	015	34,407
Oxford	017	55,604
Penobscot	019	146,015
Piscataquis	021	17,203
Sagadahoc	023	35,983
Somerset	025	50,963
Waldo	027	37,628
Washington	029	33,401
York	031	195,487

Total		1,294,464

The second type of census data used by Maine DEP in calculating area source emissions is employment data for specific business sectors. This employment data is obtained from the Census County Business Patterns web.[11] The site provides data on the total number of establishments, mid-March employment, first quarter and annual payroll, and number of establishments. The data is sorted into nine employment-size classes by detailed industry for all counties in the United States and the District of Columbia. This sorting has some inherent inaccuracies because, for sectors with very few employers, only the range for the number of employees is used, not the actual number of employees. Usually the total number of employees for the state can be obtained, and this statewide total was used to aid in selecting the appropriate range at the county level. It should be noted that in EPA's preliminary 2002 emissions inventory, EPA used the maximum number in the range. In some cases this significantly overestimates the source emissions, as determined by total state employment numbers. Therefore, in some cases Maine DEP used the mid-range number of employees. The narrative for the specific source category specifies when the mid-range and when the maximum value was used.

In addition, the County Business Patterns protects against double counting by requiring each company operating at more than one location to file a separate report for each store, factory, shop or other location. Each establishment is assigned a separate industry classification based on its primary activity and not that of its parent company.

When two or more activities were conducted at a single location under a single ownership, all activities generally were grouped together as a single establishment. The entire establishment was classified on the basis of its major activity and all data for it were included in that classification. However when distinct and separate economic activities (for which different industry classification codes were appropriate) were conducted at single location under a single ownership, separate establishments reports for each of the different activities were obtained in the census.

Paid employees consist of full-time and part-time employees, including salaried officers and executives of corporations, who (for all sectors except construction and manufacturing) were on the payroll during the pay period including March 12. Included are employees on paid sick leave, paid holidays, and paid vacations; not included are proprietors and partners of unincorporated businesses.

In summary, Maine DEP has a high level of confidence and accuracy for the statewide total number of employees within a business but there may some error in the number of those employees per county.

[11] County Business Patterns, U.S. Department of Commerce, Bureau of Census. http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl.

5.2 AGRICULTURAL PRODUCTION

5.2.1 Agricultural Tilling

Maine DEP Contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

This source category looks at the emission of PM from tilling of cropland.

Maine accepted the estimation methodology for agricultural tilling as presented in the 2002 NEI and the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 2002 Methodology

The following description of the calculation methodology is quoted from EPA's "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Primary PM_{10} emissions estimates for agricultural tilling for calendar year 2002 are grown from 1998 PM_{10} emissions. Emissions for this source category are all filterable; there are no condensable emissions. The 1998 PM_{10} particulate matter emissions are calculated using a database containing county-level data on the number acres planted by type of tilling and crop type that was purchased by EPA from the Conservation Technology Information Center at Purdue University.[1] PM_{10} emissions from agricultural tilling are a function of the acres planted, the PM emission factors, the silt content of the surface soil, and the number of passes or tillings in a year.[2]

Emission estimates for 2002 are grown from national-level data on the number of acres tilled by tilling type. Puerto Rico and the U.S. Virgin Islands are assumed not to have emissions from agriculture tilling. The *2002 National Crop Residue Management Survey*[2] presents the total number of acres planted in the United States for 1998 and 2002 by type of tilling. The five types of tilling used in growing emissions are: No Tilling, Mulch Tilling, Ridge Tilling, Reduced-Tilling (15 to 30 percent residue tilling), and Intensive Tilling (zero to 15 percent residue tilling). The growth factor for 2002 emissions is determined by dividing the number of acres tilled by tillage type in 2002 by the number of acres tilled in 1998. Table 5.2.1-A presents the acres tilled by type for 1998 and 2002 and the calculated growth factor.

Table 5.2.1-A: Agricultural Production: Acres Planted and Growth Factor for 2002

Tillage System	Actual National Number of Acres Planted (Million Acres)		2002 Growth Factor
	1998	2002	
No-Till/Strip Till	47.8	55.3	1.1569
Ridge-Till	3.5	2.8	0.8000
Mulch-Till	57.9	45	0.7772
Conservation	109.2	103.1	N/A[a]
Reduced-Till (15-30% cover)	78.1	64.1	0.8207
Intensive-Till (<15% cover)	106.1	114.1	1.0754
Total	293.4[b]	281.4[b]	

[a] Conservation is not utilized to calculate emissions.
[b] Totals do not include acreage for conservation tillage system.

For each type of tillage and crop type, the county-level 1998 PM_{10} emissions were multiplied by the 2002 growth factors from Table 1 to obtain PM_{10} emissions by tillage type for 2002. These emissions were summed to get total county-level PM_{10} emissions. Once PM_{10} estimates were developed, $PM_{2.5}$ emissions were estimated by applying a particle size multiplier of 0.20 to PM_{10} emissions.[3] Table 5.2.1-B presents a summary of the 2002 national emissions for agricultural tilling.

Table 5.2.1-B: Agricultural Production: National CAP Emissions Summary

Pollutant	1998 National Emissions (tons)	2002 Growth Factor	2002 National Activity for Tilling(acres tilled)	2002 National Emissions (tons)
PM10-PRI[a]	4,366,404	See Table 1	281.4	4,202,411
PM25-PRI	873,281	Not Applicable	281.4	840,482

[a] Emissions are all filterable; there are no condensable emission.

1998 Methodology: The basis of agricultural tilling emission estimates was the number of acres of crops tilled in each county by crop type and tillage type. This data was obtained from the *National Crop Residue Management Survey*, developed by the Conservation Technology Information Center (CTIC).[4] The survey is released in November of even numbered years. Data summarizations are available on the CTIC web site at: http://www.ctic.purdue.edu/CTIC/CTIC.html.

The five types of tilling for which emissions estimates are calculated are as follows:

Conservation Till	Conventional Till
No till/strip till	0 to 15 percent residue till (Intensive Till)
Mulch till	15 to 30 percent residue till (Reduced till)
Ridge till	

Note that for the 1998 activity data for Highly Erodable Land (HEL) is a total of the amount of land in a county that is HEL or Treated HEL for all crop types. That is, this data overlaps the other crop-type-specific data. The HEL and Treated HEL data is not included for the calculation of emissions estimates.

Emission Factors

The emission factors for agricultural tilling (in lbs per acre) are calculated using the following equation:[5,6]

$$EF = 4.8 \times k \times s^{0.6} \times p$$

where:

k = dimensionless particle size multiplier (PM_{10} = 0.21; $PM_{2.5}$ = 0.042),
s = silt content of surface soil (%),
p = number of passes or tillings in a year.

The silt content of surface soil is defined as the percentage of particles (mass basis) of diameter smaller than 25 micrometers (μm) found in the soil to a depth of 10 centimeters (cm). Silt contents were assigned by comparing the USDA surface soil survey map to a USDA county map and assigning a soil type to each county. Table 5.2.1-C shows silt content assumed for each soil type.

Table 5.2.1-C: Agricultural Production: Silt Content for Soil Types in USDA Surface Soil Map

Soil Type	Silt Content (%)
Silt Loam	52
Sandy Loam	33
Sand	12
Loamy Sand	12
Clay	29
Clay Loam	29
Organic Material	10-82
Loam	40

Table 5.2.1-D shows the number of passes or tillings in a year for each crop for conservation use and conventional use.[7] No till, mulch till, and ridge till tillage systems are classified as conservation use, while 0 to 15 percent residue and 15 to 30 percent residue tillage systems are classified as conventional use.

Table 5.2.1-D: Agricultural Production: Number of Passes or Tillings Per Year

Crop	Conservation Use	Conventional Use
Corn	2	6
Spring Wheat	1	4
Rice	5	5
Fall-Seeded Small Grain	3	5
Soybeans	1	6
Cotton	5	8
Sorghum	1	6
Forage	3	3
Permanent Pasture	1	1
Other Crops	3	3
Fallow	1	1

1998 Emissions: The following equation[5,6] was used to determine the emissions from agricultural tilling for 1998. The county-level activity data is the acres of land tilled. The equation is adjusted to estimate $_{PM10}$-FIL and PM25-FIL using the following parameters: the silt content of the surface soil, a particle size multiplier, and the number of tillings per year.

$$E = c \ x \ k \ x \ s^{0.6} \ x \ p \ x \ a$$

where:
- E = $_{PM10}$-FIL or PM25-FIL emissions
- c = constant 4.8 lbs/acre-pass
- k = dimensionless particle size multiplier (PM_{10}=0.21; $PM_{2.5}$=0.042)
- s = percent silt content of surface soil, defined as the mass fraction of particles smaller than 75 µm diameter found in soil to a depth of 10 cm
- p = number of passes or tillings in a year
- a = acres of land tilled (activity data)

The EPA's Temporal Allocation Factor File (TAFF) was used to calculate seasonal activity. Daily emissions for agricultural tilling are calculated for the summer season (i.e., June through August), a time span of 92 days. For SCC 2801000003, the TAFF assumes that 25% of the emissions occur during the summer season. Thus, the county-level annual emissions were multiplied by the ratio of 0.25/92 to calculate daily emissions."

Areas for Improvement

Maine's agricultural commodities are primarily "minor" crops (i.e., not one of USDA's four designated "major" field crops – corn, soybeans, wheat or cotton), and therefore, generalizations about agricultural practices may be inaccurate. For example, most of Maine's commodities fall into the "Other Crops" category in Table 4: Number of Passes or Tillings Per Year. There is a great deal of unaccounted for variability in tilling practices between potatoes, market vegetables, and small fruits.

- EPA's calculations are not reproducible because county-level data from the *National Crop Residue Management Survey* must be purchased (for Maine, approx. $4,000).

- Maine could calculate the emissions from agricultural tilling using the emissions equation above if the following information was available:
    a) Typical or predominant soil type for each county (source: State Soil Scientist or University of Maine Cooperative Extension);

    b) Average number of tillings for crops in Maine (source: UMCE Crop Specialists); and

    c) Acres, by county, for each crop in Maine (source: 2002 Agricultural Census, county-level data to be released in June 3, 2004).

References

1. *National Crop Residue Management Survey*, Conservation Technology Information Center, 1998 http://www.ctic.purdue.edu/CTIC/CTIC.html

2. *National Crop Residue Management Survey*, Conservation Technology Information Center, 2002 http://www.ctic.purdue.edu/CTIC/CTIC.html

3. Agricultural Activities Influencing Fine Particulate Matter Emissions, Woodard, Kenneth R., Midwest Research Institute, March 1996.

4. *National Crop Residue Management Survey*, Conservation Technology Information Center, 2000 http://www.ctic.purdue.edu/CTIC/CTIC.html

5. *The Role of Agricultural Practices in Fugitive Dust Emissions*, T.A. Cuscino, Jr., et al., California Air Resources Board, Sacramento, CA, June 1981.

6. Memorandum from Chatten Cowherd of Midwest Research Institute, to Bill Kuykendal of the U.S. Environmental Protection Agency, Emission Factor and Inventory Group, and W.R. Barnard of E.H. Pechan & Associates, Inc., September 1996.

7. Agricultural Activities Influencing Fine Particulate Matter Emissions, Woodard, Kenneth R., Midwest Research Institute, March 1996.

5.2.2 Animal Husbandry

Maine DEP Contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

Maine accepted the estimation methodology for animal husbandry as presented in the 2002 NEI and the emission estimates for the state, as a whole. However, the county-level emissions estimates will need to be adjusted based on data from the 2002 Agricultural Census (to be released in June, 2004).

<u>EPA 2002 Methodology</u>

The following descriptions of the calculation methodology is taken from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Table 1 presents a national summary of activity and ammonia emissions by SCC for the animal husbandry nonpoint source category.

Ammonia is a by-product of the microbial decomposition of the organic nitrogen compounds in manure. The volatilization of ammonia from a manure management operation is dependant on the total ammonia concentration, temperature, pH, and storage time. Ammonia emissions were estimated using a process-based inventory model. Emissions were estimated at the county level based on annual average animal populations for each county. For the beef, dairy, swine, and poultry sectors, emissions were estimated for animal confinement; manure handling and storage; and land application processes (total facility emissions were estimated for the sheep, goat, and horse sectors). For 2002, EPA refined the NEI methodology for estimating ammonia emissions. A detailed description of the methodology is presented in *National Emissions Inventory-Ammonia Emissions for Animal Husbandry Operations.*[1]

The county-level animal populations for beef, dairy, swine, and poultry were apportioned to one or more manure management trains (MMTs). A MMT consists of an animal confinement area (e.g., housing, drylot, pasture); components used to store, process, or stabilize the manure (e.g., anaerobic lagoons, solid separators); and a land application site where manure is applied as a fertilizer source. Eighteen MMT scenarios were developed for the inventory.

County-level animal populations were obtained from the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service and the 1997 Census of Agriculture, and data from the Food and Agriculture Organization of the United Nations.[2, 3] The EPA developed and apportioned MMTs using data from a variety of sources including USDA, the Census of Agriculture, and EPA's Office of Water rulemaking records. Emission factor data were obtained from a series of literature reviews.

County-level emissions were estimated using emissions factors for each type of animal and each component of the 18 MMTs. The emission factors are based on either the ammonia emitted per head or on the percentage of ammonia lost during each MMT component. The estimation procedure took into account the amount of nitrogen in the manure and loss of nitrogen during each stage of the manure management. First, emissions were estimated from the animal confinement area. Next, the nitrogen content was adjusted for volatilization of ammonia. For each subsequent component of the MMT, the amount of nitrogen and the ammonia emissions were calculated. This procedure accounts for any regional differences in ammonia emissions caused by the different types of MMTs used in each State. It also ensures that emissions are constrained by the amount of available nitrogen in each process. Table 2 presents the emission factors and the percent of nitrogen lost for each MMT.

There are control techniques available to limit ammonia emissions from animal husbandry operations. However, these techniques are not widely used and have a negligible affect on the national inventory. Therefore, the estimates were not adjusted for any control of ammonia emissions. For sample calculations, see *National Emissions Inventory-Ammonia Emissions for Animal Husbandry Operations.*[1"]

It is important to note that the beef cattle production feedlot operations values and the poultry production manure storage and handling values represent total emissions. When the 2002 point source NEI is released, it will be necessary to determine whether there are point source emissions in SCCs 30202001 and 30202002 (for beef cattle feedlots) and SCCs 30202101 through 30202106 (for poultry production manure storage and handling) that will need to be subtracted to yield the nonpoint source emission estimates for this category.

Table 5.2.2-A: Animal Husbandry: 2002 National Ammonia (NH3) Emissions

SCC	SCC Description	2002 National Activity Level (Head of Animals)	2002 National Emissions(tons/year)
2805001100	Beef cattle - finishing operations on feedlots (drylots)/Confinement	13,126,212	165,390
2805001200	Beef cattle - finishing operations on feedlots (drylots)/Manure handling and storage	13,126,212	51
2805001300	Beef cattle - finishing operations on feedlots (drylots)/Land application of manure	13,126,212	134,863
2805002000	Beef cattle production composite/Not Elsewhere Classified	73,257	344
2805003100	Beef cattle - finishing operations on pasture/range/Confinement	74,729,454	356,000
2805007100	Poultry production - layers with dry manure management systems/Confinement	367,668,832	163,613
2805007300	Poultry production - layers with dry manure management systems/Land application of manure	367,668,832	4,345
2805008100	Poultry production - layers with wet manure management systems/Confinement	62,551,237	7,819
2805008200	Poultry production - layers with wet manure management systems/Manure handling and storage	62,551,237	21,402
2805008300	Poultry production - layers with wet manure management systems/Land application of manure	62,551,237	3,628
2805009100	Poultry production - broilers/Confinement	1,671,216,008	182,642
2805009200	Poultry production - broilers/Manure handling and storage	1,654,503,941	29,675
2805009300	Poultry production - broilers/Land application of manure	1,654,503,941	147,141
2805010100	Poultry production - turkeys/Confinement	90,386,876	50,288
2805010200	Poultry production - turkeys/Manure handling and storage	89,483,058	8,154
2805010300	Poultry production - turkeys/Land application of manure	89,483,058	40,430
2805018000	Dairy cattle composite/Not Elsewhere Classified	302,333	11,004

SCC	SCC Description	2002 National Activity Level (Head of Animals)	2002 National Emissions(tons/year)
2805019100	Dairy cattle - flush dairy/Confinement	1,550,552	41,128
2805019200	Dairy cattle - flush dairy/Manure handling and storage	1,550,552	114,474
2805019300	Dairy cattle - flush dairy/Land application of manure	1,550,552	10,160
2805021100	Dairy cattle - scrape dairy/Confinement	4,931,797	53,385
2805021200	Dairy cattle - scrape dairy/Manure handling and storage	4,931,797	91,320
2805021300	Dairy cattle - scrape dairy/Land application of manure	4,931,797	101,085
2805022100	Dairy cattle - deep pit dairy/Confinement	189,116	6,084
2805022200	Dairy cattle - deep pit dairy/Manure handling and storage	189,116	249
2805022300	Dairy cattle - deep pit dairy/Land application of manure	189,116	3,441
2805023100	Dairy cattle - drylot/pasture dairy/Confinement	6,036,860	55,760
2805023200	Dairy cattle - drylot/pasture dairy/Manure handling and storage	6,036,860	1,043
2805023300	Dairy cattle - drylot/pasture dairy/Land application of manure	6,036,860	68,959
2805025000	Swine production composite/Not Elsewhere Classified (see also 28-05-039, -047, -053)	1,126,929	8,778
2805030000	Poultry Waste Emissions/Not Elsewhere Classified (see also 28-05-007, -008, -009)	7,589,198	5,101
2805035000	Horses and Ponies Waste Emissions/Not Elsewhere Classified	5,300,000	71,285
2805039100	Swine production - operations with lagoons (unspecified animal age)/Confinement	27,146,440	81,439
2805039200	Swine production - operations with lagoons (unspecified animal age)/Manure handling and storage	27,146,440	159,551
2805039300	Swine production - operations with lagoons (unspecified animal age)/Land application of manure	27,146,440	13,764
2805040000	Sheep and Lambs Waste Emissions/Total	6,685,000	24,835
2805045000	Goats Waste Emissions/Not Elsewhere Classified	1,989,799	14,028
2805047100	Swine production - deep-pit house operations (unspecified animal age)/Confinement	31,203,204	113,892
2805047300	Swine production - deep-pit house operations (unspecified animal age)/Land application of manure	31,203,204	51,080
2805053100	Swine production - outdoor operations (unspecified animal age)/Confinement	502,159	964
	Totals	**6,492,215,727**	**2,418,595**

Areas for Improvement

- EPA used 1997 Agricultural Census county level distributions applied to 2002 USDA NASS animal reports to estimate county-level animal populations. When the 2002 Agricultural Census is released later this year, reapportionment factors will be calculated and applied to the county level emission data for each SCC.

where: $E_{NEI\text{-}ME,cnty}$ = County level emissions calculated by Maine

$$E_{NEI-ME,cnty} = E_{NEI-EPA,cnty} \times \left(\frac{\left(\frac{pop_{2002,cnty}}{pop_{2002,state}} \right)}{\left(\frac{pop_{1997,cnty}}{pop_{1997,state}} \right)} \right)$$

$E_{NEI\text{-}EPA,cnty}$ = County level emissions calculated by EPA
$pop_{2002,cnty}$ = Animal population reported in 2002 Agricultural Census for specific county
$pop_{2002,state}$ = Animal population reported in 2002 Agricultural Census for entire state
$pop_{1997,cnty}$ = Animal population reported in 1997 Agricultural Census for specific county

$pop_{1997,state}$ = Animal population reported in 1997 Agricultural Census for entire state

- The following table provides a crosswalk between Animal Groups in USDA's Agricultural Census and the Ammonia Inventory Animal Groups. The crosswalk does not correspond cleanly with SCC, as data is missing from the EPA's *National Emission Inventory – Ammonia Emissions from Animal Husbandry Operations* (Draft Report, January 30, 2004) to adequately draw those connections. As such, Maine will use the following animal group populations to calculate reapportionment factors for the Animal Husbandry SCCs listed in the chart below.

Animal Groups from *Agricultural Census*	Ammonia Inventory Animal Groups	SCC		
Cows and heifers that have calved, milk cows	Dairy Cows Dairy Heifers	2805019100 2805019200 2805019300 2805021100 2805021200 2805021300 2805022100 2805022200 2805022300		2805018000 2805023100 2805023200 2805023300
Cattle fattened on grain and concentrates, sold	Beef Heifers (Feedlots) Beef Steer (Feedlots)	2805001100 2805001200 2805001300	2805002000	
Cows and heifers that have calved, beef cows	Beef Cows (Outdoor Confinement Area)	2805003100		
Heifer and heifer calves	Heifers (Outdoor Confinement Area)			
Steers, steer calves, bulls, and bull calves	Steer (Outdoor Confinement Area) Bulls (Outdoor Confinement Area) Calves (Outdoor Confinement Area)			
Hogs and pigs used or to be used for breeding	Breeding Swine	2805025000		
Other hogs and pigs	Market Swine 60-119 lbs Market Swine 120-179 lbs Market Swine greater than 180 lbs	2805039100 2805039200 2805039300 2805047100 2805047300 2805053100		
Any poultry, layers and pullets 13 weeks old or older	Layers, 1 Year Old and Older Total Pullets Other Chickens	2805007100 2805007300 2805008100 2805008200 2805008300	2805030000	
Any poultry, broilers and other meat-type chickens	Broilers	2805009100 2805009200 2805009300		
Any poultry, turkeys	Turkeys	2805010100 2805010300 2805010200		
Sheep and lambs inventory	Sheep	2805040000		
Milk goats, inventory Angora goats, inventory	Goats	2805045000		
Horses and ponies inventory	Horses	2805035000		

References

1. *National Emissions Inventory-Ammonia Emissions for Animal Husbandry Operations, Draft Report*. U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, NC. January 30, 2004. http://www.epa.gov/ttn/chief/ap42/ch09/

2. *Commodity Reports*. U.S. Department of Agriculture. National Agricultural Statistics Service. Washington D.C. 2003. http://www.usda.gov/nass/pubs/estindx.htm

3. U.S. Department of Agriculture. *1992 and 1997 Census of Agriculture* (CD-ROM), National Agricultural Statistics Service. Washington D.C. 1999.

4. *Animal Husbandry (Swine, Poultry, Cattle) Area Source Category Calculation Methodology Sheet.* Mid-Atlantic Regional Air Management Association, Baltimore, MD. March 29, 2004. http://www.marama.org/visibility/Calculation_Sheets/Ag_Tilling.pdf

5.2.3 Beef Cattle Feedlots

Maine DEP Contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

Maine accepted the estimation methodology for PM emissions for Beef Cattle Feedlots as presented in the 1999 NEI, and the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 1999 Methodology

The following descriptions of the calculation methodology is taken from "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia: Area Sources." Emission Factor and Inventory Group, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, January 31, 2004.

1999 PM_{10} emissions from beef cattle feedlots are estimated using the number of head of beef cows published by the Census of Agriculture and a national PM_{10} emission factor. County-level activity data for beef cattle feedlots are obtained from the Census of Agriculture using the same methodology that is used to obtain Animal Husbandry activity data.

$PM_{2.5}$ emissions are determined by multiplying the PM_{10} emissions for each year by a particle size multiplier of 0.15.

The equations for this method are:

$$E_{PM_{10}} = EF_{PM_{10}} \times HBC_{co}$$

where: $E_{PM_{10}}$ is county-level emissions of PM_{10},

$EF_{PM_{10}}$ is the PM_{10} emission factor (17 tons/1,000 head), and

HBC_{co} is the number of head of beef cows (expressed in 1,000 head) in a given county

$$E_{PM_{2.5}} = E_{PM_{10}} \times 0.15$$

where: $E_{PM_{2.5}}$ is the county-level emissions of $_{PM2.5}$"

EPA 2002 Methodology

Except for Idaho, 1999 $_{PM10}$-PRI/-FIL and $_{PM2.5}$-PRI/-FIL emissions for the beef cattle feedlots category were not carried forward because of the uncertainty with the default NEI estimates prepared by EPA. Idaho is the only state that submitted its own 1999 emissions data for this category; therefore, Idaho's 1999 emissions were carried forward and included in the 2002 NEI.

Areas for Improvement

It is unclear whether EPA is going to return to Census of Agriculture data (2002 to be released soon) or used the methodology for counting head of beef cattle as described in the Animal Husbandry category (using NASS data and then attributing to counties using the Census of Agriculture). While Maine accepts EPA estimates, they will need to be further investigated.

5.2.4 Fertilizers

Maine DEP Contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

U.S. EPA is carrying forward emissions estimates for ammonia from fertilizers from the 1999 National Emissions Inventory because 2002 fertilizer usage data were not available.

Maine accepted the estimation methodology for fertilizers as presented in the 1999 NEI, and the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 1999 Methodology

The following description of methodology is taken from "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia: Area Sources." Emission Factor and Inventory Group, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, January 31, 2004.

The activity data used by EPA to estimate 1999 NH_3 fertilizer emissions was obtained from the Commercial Fertilizers Database compiled by the Association of American Plant Food Control Officials. This database includes county-level usage of over 100 different types of fertilizers, including those that emit NH_3.

Emission Factors

Emissions factors were then applied to calculate pounds of NH_3/ton of nitrogen.

Table 5.2.4-A: Ammonia Emission Factors for Nitrogen Fertilizers

SCC	Fertilizer Type	Emission Factor ($lbs NH_3/ton N$)
2801700001	Anhydrous Ammonia	24
2801700002	Aqua Ammonia	24
2801700003	Nitrogen Solutions	61
2801700004	Urea	364
2801700005	Ammonium Nitrate	49
2801700006	Ammonium Sulfate	194
2801700007	Ammonium Thiosulfate	64
2801700008	Other Straight Nitrogen	61
2801700009	Ammonium Phosphates	97
2801700010	N-P-K	97
Source: Asman, William, A.H. *Ammonia Emissions in Europe: Updated Emission and Emission Variations,* National Institute of Public Health and Environmental Protections, Biltoven, The Netherlands, May 1992 as printed in U.S. EPA, *Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia: Area Sources,* January 31, 2004.		

"The equation for emissions of NH_3 is:

$$E_i = EF_i * N_{co}$$

where: E_i is the NH_3 county-level emissions,
EFi is the NH3 emissions factor listed in the table above, and
N_{co} is the county-level fertilizer usage data from the Commercial Fertilizers Database."

Areas for Improvement

- EPA's calculations are based on 1999 fertilizer usage data. A review of the AAPFCO website (http://www.aapfco.org#pubs) reveals that 2002 fertilizer data is now available. In an e-mail from Roy Huntley, U.S. EPA, on April 29, 2004, he confirmed that the plan is for EPA to calculate ammonia emissions based on 2002 data during the summer of 2004 and have new emissions numbers ready for the 2002 draft NEI, which will be released for review in February 2005.

- Although the Maine Department of Agriculture, Food and Rural Resources collects fertilizer sales data, at this time, we do not believe that it would provide more accurate, county-level use data without further analysis of the AAPFCO database.

5.2.5 Grain Elevators: Terminal

EPA does not attribute any emissions to Maine from this activity (SCC: 30200512). Therefore, this category will no longer be included in future NEI calculations.

5.3 CONSTRUCTION

5.3.1 Residential Construction

Maine DEP Contact: Doug Saball (207)287-8123 or Doug.Saball@maine.gov

Maine has reviewed and accepts EPA's methodology for estimating PM_{10} and $PM_{2.5}$ emissions from residential construction (SCC: 2311010000), as presented in EPA's preliminary 2002 NEI. Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 2002 Methodology

The following descriptions of calculation methodology are taken from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

EPA estimated Primary PM_{10} and $PM_{2.5}$ area source emissions from residential construction. Emissions for this source category are all filterable; there are no condensable emissions. Emissions from residential construction activity are a function of the acreage disturbed and volume of soil excavated during residential construction. Residential construction activity is developed from data obtained from the U.S. Department of Commerce (DOC)'s Bureau of the Census.

Annual regional housing starts data by housing category (1-unit, 2 to 4-units, 5-units or more) are developed from the 2002 New Privately Owned Housing Units Started. Table 5.3.1-A presents the housing starts data obtained from the DOC. The resulting annual regional housing starts for each housing category are then converted from 'number of units' data into 'number of structures' data. The regional number of structures started in 2002 is then allocated to counties. The Permits by County data for 2002 is used to calculate the ratio of the number of building permits in each county to the total number of building permits in the region. This ratio is then used to estimate the number of structures started in each county. Appendix B of EPA's Preliminary NEI documentation for 2002 contains the permit data by county.

Table 5.3.1-A. New Privately Owned Housing Units Started in 2002 (thousands)

Month	Total	1 unit	2 to 4 units	5 or more units	Northeast Total	Midwest Total	South Total	West Total	Northeast 1 unit	Midwest 1 unit	South 1 unit	West 1 unit
Jan	110.4	84.7	4.7	21.1	8.9	18.1	57.0	26.4	6.4	13.4	44.2	20.6
Feb	120.4	99.1	2.9	18.4	7.8	20.6	61.7	30.2	6.6	17.1	51.2	24.2
Mar	138.2	109.5	3.7	25.0	13.1	25.6	65.0	34.5	10.1	19.9	50.7	28.8
Apr	148.8	122.2	2.3	24.2	11.3	27.4	74.4	35.7	9.1	24.6	58.9	29.6
May	165.5	133.7	3.2	28.5	15.5	36.0	74.8	39.1	12.3	27.6	61.8	32.1
Jun	160.3	130.1	4.0	26.2	17.5	35.4	70.3	37.1	13.6	31.0	54.9	30.5
Jul	155.9	125.2	2.9	27.8	14.9	35.5	68.2	37.2	9.2	**28.5**	55.6	31.9
Aug	147.0	111.4	2.9	32.6	16.5	31.0	67.3	32.1	12.0	21.4	52.0	26.0
Sep	155.6	124.0	3.2	28.4	15.9	34.5	67.5	37.8	10.8	25.9	55.6	31.7
Oct	146.8	118.8	3.2	24.9	13.4	30.7	60.7	42.0	10.5	23.9	52.4	32.0
Nov	133.0	102.6	2.9	27.5	12.0	30.5	59.5	31.1	9.0	23.8	46.8	23.1
Dec	123.1	97.2	2.6	23.3	11.6	24.4	54.9	32.2	8.1	19.7	44.1	25.3

The percentage of one family houses with basements is obtained from the U.S. Census Bureau in the report *Characteristics of New Houses,* Type of Foundation in New One Family Houses Completed. Table 5.3.1-B presents the percentage of one-family homes with basements for each region. The percentages are applied to 1-unit structures to obtain the number of structures with basements in each county.

Table 5.3.1-B. Type of Foundation in New One Family Houses Completed in 2002

Region	Total	Full or Partial Basement	Slab or other Type	Crawl Space	Percent Basements
Northeast	113	100	9	4	0.8850
South	615	90	403	122	0.1463
Midwest	272	205	46	21	0.7537
West	325	60	203	62	0.1846
United States	1,325	455	661	208	0.3434

The county-level housing starts by structure type is used to estimate the acreage disturbed due to residential construction. The total area disturbed in each county is calculated by assuming an average acreage disturbed for each type of structure as given below:

1-Unit - 1/4 acre/structure
2-Unit - 1/3 acre/structure
Apartment - 1/2 acre/structure

The U.S. Census Bureau no longer reports separate data for 2-unit structures, but groups them into a 2 to 4-units category. However, the Census Bureau was contacted to request the number of 2-unit structure starts and number of 3 to 4-unit structure starts. The available national data are displayed in Table 3. The ratio of number of 2-unit structure starts and number of 3 to-4 unit structure starts to number of 2 to 4-unit structure starts was then computed as shown in Table 5.3.1-C. These ratios were used to allocate the number of 2 to 4-unit starts in each region to 2-unit starts and 3 to 4-unit starts.

Table 5.3.1-C. National Number of Housing Starts for 2-units and 3 to 4-units

	2 units	3-4 units	Total
National Starts (thousands)	14	24	38
Ratios	0.368	0.632	

The cubic yards of dirt excavated for 1-unit structures with basements is also estimated. This estimation assumes all single-family homes are 2,000 square feet in area, have a basement depth of 8 feet, and have additional peripheral dirt removed amounting to 10% of the basement volume. Table 5.3.1-D summarizes the activity data for residential construction.

Table 5.3.1-D. Summary of National Activity Data for Residential Construction

Type of Structure	Units	Activity
Apartments	acres disturbed	12,828
2-Unit Structures	acres disturbed	2,363
1-Unit Structures w/o Basements	acres disturbed	222,949
1-unit Structures with Basements	acres disturbed	116,676
1-unit Structures with Basements	cubic yards excavated	304,220,908

Emission Factors

Initial PM_{10} emissions from construction of single family, two family, and apartments structures are calculated using the emission factors given in Table 5.3.1-E. The duration of construction activity for houses is assumed to be 6 months and the duration of construction for apartments is assumed to be 12 months. For single-unit houses with basements, emissions are calculated assuming best available control measures (BACM). The BACM Level 2 emission factor equation is applied to the acreage disturbed and the cubic yards of dirt excavated.

Table 5.3.1-E. Emission Factors for Residential Construction

Type of Structure	Emission Factor	Duration of Construction
Apartments	0.11 tons $_{PM10}$ /acre-month	12 months
2-Unit Structures	0.032 tons $_{PM10}$ /acre-month	6 months
1-Unit Structures w/o Basements	0.032 tons $_{PM10}$ /acre-month	6 months
1-unit Structures with Basements	0.011 tons $_{PM10}$ /acre-month	6 months
	0.059 tons $_{PM10}$ /1000 cubic yards	

Adjustments: Regional variances in construction emissions are corrected using soil moisture level, silt content, and control efficiency. These correction parameters are applied to initial PM_{10} emissions from residential construction to develop the final emissions inventory.

To account for the soil moisture level, the PM_{10} emissions are weighted using the precipitation-evaporation (PE) values from Thornthwaite's PE Index. Average precipitation evaporation values for each State were estimated based on PE values for specific climatic divisions within a State. These values range from 7 to 41.

To account for the silt content, the PM_{10} emissions are weighted using average silt content for each county. A data base containing county-level dry silt values was complied. These values were derived by applying a correction factor developed by the California Air Resources Board to convert wet silt values to dry silt values.[7]

The equation for PM_{10} emissions corrected for soil moisture and silt content is:

$$Corrected\ E_{PM10} = Initial\ E_{PM10} \times \frac{24}{PE} \times \frac{S}{9\%}$$

where: Corrected E_{PM10} = PM_{10} emissions corrected for soil moisture and silt content,
PE = precipitation-evaporation value for each State,
S = % dry silt content in soil for area being inventoried.

Nonattainment areas are assumed to require controls for PM emissions from residential construction activity. A control efficiency of 50 percent is assumed for both PM_{10} and $PM_{2.5}$ in nonattainment areas.

Once PM_{10} estimates are developed, $PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.20 to PM_{10} emissions.[1]

It is important to note that the residential construction values represent total emissions. When the 2002 point source NEI is released, it will be necessary to determine whether there are point source emissions in SCCs 31100101 through 31100103 that may need to be subtracted to yield the nonpoint source emission estimates for this category.

Table 5.3.1-F. National Emissions Summary for Residential Construction

Pollutant	Emission Factor	Emission Factor Reference	National Activity Level (Reference 2,3,4)	National Emissions (tons/year)
PM_{10} -PRI	See Table 2	Reference 1	See Table 1	100,086
PM_{25}-PRI	See Table 2	Reference 1	See Table 1	20,017

<u>References</u>

1. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, "Technical Memorandum: Revised Methodology for Estimating Emissions from Construction." Prepared by E.H. Pechan & Associates. Research Triangle Park, NC. September 2000.

2. U.S. Department of Commerce, Bureau of the Census. Construction Statistics. *Housing Starts - New Privately Owned Housing Units Started.* 2002.

3. U.S. Department of Commerce, Bureau of the Census. Construction Statistics. *Annual Characteristics of New Housing - Type of Foundation in New One-Family Houses Completed,* 2002.

4. U.S. Department of Commerce, Bureau of the Census. Construction Statistics. *Annual Housing Units Authorized by Building Permits - Permits by County.* 2002.

5. U.S. Census Bureau, Residential Construction Branch, personal communication with P. Hemmer of E.H. Pechan & Associates, Inc., June 2003.

6. Midwest Research Institute. Improvement of Specific Emission Factors (BACM Project No. 1). Prepared for South Coast Air Quality Management District. March 29, 1996.

7. Campbell, 1996: Campbell, S.G., D.R. Shimp, and S.R. Francis. *Spatial Distribution of PM-10 Emissions from Agricultural Tilling in the San Joaquin Valley,* pp. 119-127 in Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association, Reno, NV. 1996."

5.3.2 Non-Residential Construction

Maine DEP Contact: Doug Saball (207)287-8123 or Doug.Saball@maine.gov

EPA did not calculate PM emissions for Non-Residential Construction (SCC: 23110200000) for the preliminary 2002 NEI because the necessary activity data was not available. Rather, EPA carried forward the estimates from the 1999 NEI. EPA intends to use the Bureau of Labor Standards employment Wages data for 2002 to update emissions from this category, when they become available.

Maine has reviewed and accepts EPA's methodology for estimating PM_{10} and $PM_{2.5}$ emissions from non-residential construction, as presented in "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia Area Sources."[12]

[12] Pechan, Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia Area Sources (Prepared for the Office of Air Quality Planning and Standards, Emission Factor and

EPA 1999 Methodology

PM_{10} emissions produced from the construction of nonresidential buildings are estimated using the value of construction put in place. The national value of construction put in place is obtained from the Bureau of the Census, and is allocated to counties using construction employment data for SIC 154. The Bureau of Labor Statistics (BLS) county employment data were supplemented with Dun & Bradstreet (D&B) county employment data. The BLS included employment data in State totals that were withheld (not reported) for many counties. D&B reported employment data for many counties for which BLS data were not available. Thus, used D&B county proportion of State total and applied proportion to BLS State total to estimate county employment for counties where employment was withheld. These data were used to allocate national expenditure data for non-residential construction to counties.

A conversion factor of 1.6 acres/106 dollars ($) is applied to the construction valuation data. This conversion factor is developed by adjusting the 1992 value of 2 acres/$106 to 1999 constant dollars using the Price and Cost Indices for Construction. The duration of construction activity for nonresidential construction is estimated to be 11 months.

5.3.3 Roadway Construction

Maine DEP Contact: Doug Saball (207)287-8123 or Doug.Saball@maine.gov

EPA did not calculate PM emissions for Roadway Construction (SCC: 2311030000) for the preliminary 2002 NEI because the necessary activity data was not available. Rather, EPA carried forward the estimates from the 1999 NEI. EPA intends to use Federal Highway Administration (FHWA) data for 2002 to update emissions from this category, when they become available.

Maine has reviewed and accepts EPA's methodology for estimating PM_{10} and $PM_{2.5}$ emissions from roadway construction, as presented in "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia Area Sources."[13]

EPA 1999 Methodology

PM_{10} emissions produced by road construction are estimated using an emission factor for heavy construction and the State capital outlay for new road construction. To estimate the acres disturbed by road construction, obtained 1999 Federal Highway Administration (FHWA) State expenditure data for capital outlay according to the following six classifications:

- Interstate, urban;
- Interstate, rural;
- Other arterial, urban;
- Other arterial, rural;
- Collectors, urban; and
- Collectors, rura
l

Inventory Group, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. Prepared by E.H. Pechan & Associates, Inc., 3622 Lyckan Parkway, Suite 2002, Durham, NC 27707) January 31, 2004.

[13] Pechan, Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia Area Sources (Prepared for the Office of Air Quality Planning and Standards, Emission Factor and Inventory Group, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. Prepared by E.H. Pechan & Associates, Inc., 3622 Lyckan Parkway, Suite 2002, Durham, NC 27707) January 31, 2004.

Obtained data from the North Carolina Department of Transportation (NCDOT) (sic) on the $/mile spent on various road construction projects. For interstate expenditures, used an average of $4 million/mile corresponding to freeways and interstate projects listed for: 1) new location; 2) widen existing 2-lane shoulder section; and 3) widen existing 4-lane w/ median. For expenditures on other arterial and collectors, used an average of $1.9 million/mile corresponding to all other projects (excluding freeways and interstate projects) listed for: 1) new location; 2) widen existing 2-lane shoulder section; and 3) widen existing 4-lane w/ median. Miles are converted to acres for each of the 6 road types using the following estimates of acres disturbed per mile:

- Interstate, urban and rural; Other arterial, urban - 15.2 acres/mile
- Other arterial, rural - 12.7 acres/mile
- Collectors, urban - 9.8 acres/mile
- Collectors, rural - 7.9 acres/mile

State-level estimates of acres disturbed are distributed to counties according to the housing starts per county, estimated for the residential construction category.

Emission Factor

A PM_{10} emission factor of 0.42 tons/acre/month is used to account for the large amount of dirt moved during the construction of roadways.

The duration of construction activity for road construction is estimated to be 12 months.

Correction Parameters: The following correction parameters are applied to all construction emissions.

Soil Moisture Level: To account for the soil moisture level, base emissions were multiplied by 24 divided by the precipitation-evaporation (PE) value. Precipitation-Evaporation (PE) values were obtained from Thornthwaite's PE Index. Average PE values for each State were estimated based on PE values for specific climatic divisions within a State.

Silt Content: To account for the silt content, base emissions were multiplied by percent dry silt content in soil divided by 9 percent. County-level dry silt values were applied to PM_{10} emissions for each county.

Control Efficiency: For 1999 construction emissions, a control efficiency of 50 percent is used for both PM_{10} and $PM_{2.5}$ for PM nonattainment areas.

$PM_{2.5}$ emissions are estimated by applying a particle size multiplier of 0.20 to PM_{10} emissions.

Ozone Season Daily (OSD) emissions calculated by multiplying annual emissions by 0.25 then dividing by 92.

5.4 COOKING

5.4.1 Bakeries

Maine will no longer be including emissions from Bakeries (SCC: 30203201 & 30203202) as a area source category in the National Emissions Inventory since it comprises a negligible portion of the VOC inventory.

We base this determination on the following emissions estimates included in Maine's 1990, 1993, 1996 and 1999 Periodic Emissions Inventories (PEI).

Inventory Year	Bakery VOC Emissions	Total Area VOC Emissions	Bakery as % Area VOC	Total State VOC Emissions	Bakery as % State VOC
1990	0.528	97.013	0.54%	9515.058	0.01%
1993	0.528	93.109	0.57%	9467.301	0.01%
1996	0.527	92.404	0.57%	9457.359	0.01%
1999	0.520	58.375	0.89%	9530.431	0.01%

If a bakery were to increase its VOC emissions, it would most likely be included in Maine's point source emissions inventory. We believe area source emissions from bakeries have been and will continue to be a negligible contributor to the state's total VOC emissions.

5.4.2 Breweries and Wineries

Maine will no longer be including emissions from Breweries (SCC: 230207001) and Wineries (SCC: 230207005) as a nonpoint source category in the National Emissions Inventory since this is a negligible source of VOCs in Maine.

We base this determination on the following emissions estimates included in the 1990, 1993, 1996 and 1999 Periodic Emissions Inventories (PEI).

PEI Year	Brewery VOC Emissions	Winery VOC Emissions
1990	0.000	0.000
1993	0.000	0.000
1996	0.000	0.000
1999	0.000	0.000

Area source emissions from breweries and wineries have been and will continue to be a negligible contributor, if one at all, to the state's total VOC emissions.

5.4.3 Commercial Cooking

Maine DEP contact: Tammy Gould (207)287-7036 or Tammy.Gould@maine.gov

Maine accepts the methodology approached for all five Commercial Cooking categories (Chain-driven (conveyorized) charbroilers, SCC: 2302002100; Under-fired charbroilers. SCC: 2302002200; Flat griddles, SCC: 2302002300; Clamshell griddles, SCC: 2302002400, and Deep-fat fryers, SCC:

2302002500) as presented in the preliminary 2002 NEI. Maine has conducted its own calculations for this category.

EPA 2002 Methodology

The methodology is derived in part from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004

Commercial cooking emissions were estimated for five source categories, which are based on equipment type. The equipment types include: chain-driven (conveyorized) charbroilers (SCC 2302002100), under-fired charbroilers (2302002200), flat griddles (2302002300), clamshell griddles (2302002400), and deep-fat fryers (2302002500). Source categories comprise emissions from all meat types for a particular piece of equipment. The following types of meat are included: hamburger, steak, fish, pork, and chicken. Emissions for deep-fat frying of french fries were also estimated.

With the exception of deep-fat frying of french fries, commercial cooking activity was developed from survey data obtained from a Public Research Institute (PRI) report on charbroiling activity estimation in the State of California.[14] Table 5.4.3-A presents the average pounds of meat cooked on each type of equipment per week. Tables 5.4.3-B and 5.4.3-C provide data from the PRI survey that were also used to construct the activity data. Table 5.4.3-B presents the percent of restaurants by restaurant type with each cooking equipment type. Table 5.4.3-C presents the average number of equipment pieces by restaurant type. Weekly commercial cooking activity data for meat were estimated by first multiplying the county number of restaurants in Dun & Bradstreet (D&B) industry classifications that use commercial cooking equipment by the percentage of restaurants with each type of cooking equipment (Table 5.4.3-B).[15] The resulting product is then multiplied by the number average number of equipment pieces by restaurant type (Table 5.4.3-C), and then by the average weekly pounds of meat cooked by equipment type (Table 5.4.3-A). Table 5.4.3-D presents the D&B restaurant classifications used in this procedure. Commercial cooking activity data for each combination of equipment type and meat type were developed for each of the five restaurant types, and then summed to get county-level pounds of meat cooked on each type of equipment for all restaurants.

The mass of frozen potatoes sold in 2001 (6,736,530 lbs) was obtained from the U.S. Department of Agriculture (USDA).[16] French fries sold by fast food restaurants account for 91 percent (6,130,242 lbs) of frozen potatoes sold; 9,338 lbs of french fries were sold by other restaurant types. County-level activity data for deep fat frying of french fries at fast food restaurants were developed by applying county-to-national proportions to the national amount of french fries sold by these restaurants. These proportions were compiled using the number of fast food restaurants reported by D&B. County-level activity data for deep fat frying of french fries at all other restaurants were estimated by applying similar county-to-national proportions to the 9,338 lbs of french fries sold nationally by these restaurants. The D&B count of the number of these other restaurants was used to calculate these proportions.

The activity data were converted to tons of meat and french fries cooked on each type of equipment by dividing by 2000. The NIF allows only one entry for activity data for each SCC and county combination. Due to this limitation, county-level composite activity data were calculated by first summing the activity to

[14] Average number of equipment pieces only for the segment of restaurants estimated as having such equipment.
[15] Not clear why the number of pieces of equipment was not reported for this category.
[16] Steak and BBQ restaurants are not likely to employ chain-driven charbroilers.

get county-level tons of all food cooked on each type of equipment per week. Tons of food cooked per week were then converted to annual tons[2]/lb by multiplying by 52 weeks/year and 1 ton/2000 lb.

Table 5.4.3-A. Average Weekly Pounds of Meat Cooked by Equipment Type

Type of Meat	Chain-Driven Charbroilers	Underfired Charbroilers	Deep-Fat Fryers	Flat Griddles	Clamshell Griddles
Steak	236	180	181	166	94
Hamburger	798	270	274	362	1314
Poultry, With Skin	147	144	365	88	113
Poultry, Skinless	266	179	208	111	108
Pork	57.6	148	58.6	112	118
Seafood	119	143	159	92.1	632
Other	-	41.5	274	57.5	-

Table 5.4.3-B. Percent of Restaurants with Each Type of Cooking Equipment

Restaurant Category	Chain-Driven Charbroilers	Underfired Charbroilers	Deep-Fat Fryers	Flat Griddles	Clamshell Griddles
Ethnic	3.5	47.5	81.9	62.7	4
Family	10.1	60.9	91.4	82.9	1.4
Fast Food	18.6	30.8	96.8	51.9	14.7
Seafood	0	52.6	100	36.8	10.5
Steak & BBQ	6.9	55.2	82.8	89.7	0

Table 3. 5.4.3-C. Average Number of Equipment Pieces by Restaurant Type[10]

Restaurant Category	Chain-Driven Charbroilers	Underfired Charbroilers	Deep-Fat Fryers	Flat Griddles	Clamshell Griddles
Ethnic	1.62	1.54	1.63	1.88	1.8
Family	1.71	1.29	2.34	2.03	–[10]
Fast Food	1.07	1.58	3.1	1.43	2.09
Seafood	–	1.1	2.47	1.11	1.5
Steak & BBQ	–[11, 12]	1.63	2.42	1.35	–

Table 5.4.3-D. Dun & Bradstreet Restaurant Classifications

Restaurant Type	Dun & Bradstreet Code
Ethnic food	5812-01
Fast food	5812-03
Family	5812-05
Seafood	5812-07
Steak & Barbecue	5812-08

To develop emissions, the mass of meat and french fries cooked on each equipment type was multiplied by an appropriate emission factor. Commercial cooking criteria air pollutant and HAP emission factors can be found in the EPA report *Methods for Developing a National Emission Inventory for Commercial Cooking Processes: Technical Memorandum.*[5] The emission factors are expressed in lb/ton and g/kg, and are by equipment and food type. The NIF allows only one emission factor for each SCC and pollutant combination. Due to this limitation, weighted composite emission factors, in lb/ton, were calculated by dividing emissions by the mass of meat and french fries cooked; and then incorporated into the NIF.

Emission Factors

Table 5.4.3-E summarizes the national CAP and HAP composite emission factors, annual activity, and emissions by SCC and pollutant.

Table 5.4.3-E. Emission Factors and National Emission Estimates

SCC	Cooking Device	Pollutant	Composite Emission Factor (lb/ton)	Emission Factor Reference	Annual Activity (ton^2/lb)	National Emissions (tons)
2302002100	Conveyorized Charbroiling	VOC	4.002084	See footnote a	553.75	2,113.0
2302002100	Conveyorized Charbroiling	CO	13.364824	See footnote a	553.75	7,400.7
2302002100	Conveyorized Charbroiling	PM10-PRI	15.996058	See footnote a	553.75	8,459.7
2302002100	Conveyorized Charbroiling	PM25-PRI	15.506208	See footnote a	553.75	8,200.6
2302002100	Conveyorized Charbroiling	4-NITROPHENOL	0.003826	See footnote a	553.75	2.0
2302002100	Conveyorized Charbroiling	ACENAPHTHENE	0.000415	See footnote a	553.75	0.2
2302002100	Conveyorized Charbroiling	ACENAPHTHYLENE	0.007423	See footnote a	553.75	3.9
2302002100	Conveyorized Charbroiling	ACETALDEHYDE	0.163475	See footnote a	553.75	86.3
2302002100	Conveyorized Charbroiling	ACETOPHENONE	0.001409	See footnote a	553.75	0.7
2302002100	Conveyorized Charbroiling	ANTHRACENE	0.001669	See footnote a	553.75	0.9
2302002100	Conveyorized Charbroiling	BENZ[A]ANTHRACENE	0.000477	See footnote a	553.75	0.3
2302002100	Conveyorized Charbroiling	BENZENE	0.292169	See footnote a	553.75	154.3
2302002100	Conveyorized Charbroiling	BENZO[A]PYRENE	0.000275	See footnote a	553.75	0.1
2302002100	Conveyorized Charbroiling	BENZO[G,H,I,]PERYLENE	0.000256	See footnote a	553.75	0.1
2302002100	Conveyorized Charbroiling	BIPHENYL	0.003623	See footnote a	553.75	1.9
2302002100	Conveyorized Charbroiling	DIBUTYL PHTHALATE	0.001113	See footnote a	553.75	0.6
2302002100	Conveyorized Charbroiling	ETHYL BENZENE	0.023188	See footnote a	553.75	12.2
2302002100	Conveyorized Charbroiling	ETHYLENE DICHLORIDE	0.008116	See footnote a	553.75	4.3
2302002100	Conveyorized Charbroiling	FLUORANTHENE	0.001863	See footnote a	553.75	1.0
2302002100	Conveyorized Charbroiling	FLUORENE	0.001806	See footnote a	553.75	1.0
2302002100	Conveyorized Charbroiling	FORMALDEHYDE	0.227822	See footnote a	553.75	120.3
2302002100	Conveyorized Charbroiling	INDENO[1,2,3-C,D]PYRENE	0.000162	See footnote a	553.75	0.1
2302002100	Conveyorized Charbroiling	NAPHTHALENE	0.034368	See footnote a	553.75	18.1
2302002100	Conveyorized Charbroiling	O-CRESOL	0.000974	See footnote a	553.75	0.5
2302002100	Conveyorized Charbroiling	O-XYLENE	0.019130	See footnote a	553.75	10.1
2302002100	Conveyorized Charbroiling	PAH, TOTAL	0.081077	See footnote a	553.75	42.9
2302002100	Conveyorized Charbroiling	P-CRESOL	0.001988	See footnote a	553.75	1.0
2302002100	Conveyorized Charbroiling	PHENANTHRENE	0.008221	See footnote a	553.75	4.3
2302002100	Conveyorized Charbroiling	PHENOL	0.013333	See footnote a	553.75	7.0
2302002100	Conveyorized Charbroiling	PROPIONALDEHYDE	0.044057	See footnote a	553.75	23.3
2302002100	Conveyorized Charbroiling	PYRENE	0.002508	See footnote a	553.75	1.3
2302002100	Conveyorized Charbroiling	STYRENE	0.110143	See footnote a	553.75	58.2
2302002100	Conveyorized Charbroiling	TOLUENE	0.115940	See footnote a	553.75	61.2
2302002100	Conveyorized Charbroiling	XYLENES	0.016232	See footnote a	553.75	8.6
2302002200	Under-fired Charbroiling	VOC	3.918318	See footnote a	1,846.07	7,233.5
2302002200	Under-fired Charbroiling	CO	12.817540	See footnote a	1,846.07	23,662.1
2302002200	Under-fired Charbroiling	PM10-PRI	32.666124	See footnote a	1,846.07	60,304.0
2302002200	Under-fired Charbroiling	PM25-PRI	31.577929	See footnote a	1,846.07	58,295.1
2302002200	Under-fired Charbroiling	4-NITROPHENOL	0.005624	See footnote a	1,846.07	10.4
2302002200	Under-fired Charbroiling	ACENAPHTHENE	0.000219	See footnote a	1,846.07	0.4
2302002200	Under-fired Charbroiling	ACENAPHTHYLENE	0.005542	See footnote a	1,846.07	10.2
2302002200	Under-fired Charbroiling	ACETALDEHYDE	0.340875	See footnote a	1,846.07	629.3

SCC	Cooking Device	Pollutant	Composite Emission Factor (lb/ton)	Emission Factor Reference	Annual Activity (ton^2/lb)	National Emissions (tons)
2302002200	Under-fired Charbroiling	ACETOPHENONE	0.002804	See footnote a	1,846.07	5.2
2302002200	Under-fired Charbroiling	ANTHRACENE	0.001622	See footnote a	1,846.07	3.0
2302002200	Under-fired Charbroiling	BENZ[A]ANTHRACENE	0.000441	See footnote a	1,846.07	0.8
2302002200	Under-fired Charbroiling	BENZENE	0.586544	See footnote a	1,846.07	1,082.8
2302002200	Under-fired Charbroiling	BENZO[A]PYRENE	0.000187	See footnote a	1,846.07	0.3
2302002200	Under-fired Charbroiling	BENZO[G,H,I,]PERYLENE	0.000196	See footnote a	1,846.07	0.4
2302002200	Under-fired Charbroiling	BIPHENYL	0.002233	See footnote a	1,846.07	4.1
2302002200	Under-fired Charbroiling	DIBUTYL PHTHALATE	0.002049	See footnote a	1,846.07	3.8
2302002200	Under-fired Charbroiling	ETHYL BENZENE	0.044503	See footnote a	1,846.07	82.2
2302002200	Under-fired Charbroiling	ETHYLENE DICHLORIDE	0.018742	See footnote a	1,846.07	34.6
2302002200	Under-fired Charbroiling	FLUORANTHENE	0.002287	See footnote a	1,846.07	4.2
2302002200	Under-fired Charbroiling	FLUORENE	0.001698	See footnote a	1,846.07	3.1
2302002200	Under-fired Charbroiling	FORMALDEHYDE	0.469920	See footnote a	1,846.07	867.5
2302002200	Under-fired Charbroiling	INDENO[1,2,3-C,D]PYRENE	0.000115	See footnote a	1,846.07	0.2
2302002200	Under-fired Charbroiling	NAPHTHALENE	0.022748	See footnote a	1,846.07	42.0
2302002200	Under-fired Charbroiling	O-CRESOL	0.001799	See footnote a	1,846.07	3.3
2302002200	Under-fired Charbroiling	O-XYLENE	0.037336	See footnote a	1,846.07	68.9
2302002200	Under-fired Charbroiling	PAH, TOTAL	0.066015	See footnote a	1,846.07	121.9
2302002200	Under-fired Charbroiling	P-CRESOL	0.003632	See footnote a	1,846.07	6.7
2302002200	Under-fired Charbroiling	PHENANTHRENE	0.007460	See footnote a	1,846.07	13.8
2302002200	Under-fired Charbroiling	PHENOL	0.026010	See footnote a	1,846.07	48.0
2302002200	Under-fired Charbroiling	PROPIONALDEHYDE	0.092009	See footnote a	1,846.07	169.9
2302002200	Under-fired Charbroiling	PYRENE	0.003087	See footnote a	1,846.07	5.7
2302002200	Under-fired Charbroiling	STYRENE	0.222409	See footnote a	1,846.07	410.6
2302002200	Under-fired Charbroiling	TOLUENE	0.232132	See footnote a	1,846.07	428.5
2302002200	Under-fired Charbroiling	XYLENES	0.033076	See footnote a	1,846.07	61.1
2302002300	Flat Griddle Frying	VOC	0.355080	See footnote a	2,647.34	940.0
2302002300	Flat Griddle Frying	CO	0.733239	See footnote a	2,647.34	1,941.1
2302002300	Flat Griddle Frying	PM10-PRI	5.922517	See footnote a	2,647.34	15,678.9
2302002300	Flat Griddle Frying	PM25-PRI	4.501113	See footnote a	2,647.34	11,916.0
2302002300	Flat Griddle Frying	ACENAPHTHENE	0.000055	See footnote a	2,647.34	0.1
2302002300	Flat Griddle Frying	ACENAPHTHYLENE	0.000271	See footnote a	2,647.34	0.7
2302002300	Flat Griddle Frying	ANTHRACENE	0.000478	See footnote a	2,647.34	1.3
2302002300	Flat Griddle Frying	BENZ[A]ANTHRACENE	0.000158	See footnote a	2,647.34	0.4
2302002300	Flat Griddle Frying	BENZO[A]PYRENE	0.000030	See footnote a	2,647.34	0.1
2302002300	Flat Griddle Frying	BIPHENYL	0.000153	See footnote a	2,647.34	0.4
2302002300	Flat Griddle Frying	FLUORANTHENE	0.001409	See footnote a	2,647.34	3.7
2302002300	Flat Griddle Frying	FLUORENE	0.000362	See footnote a	2,647.34	1.0
2302002300	Flat Griddle Frying	NAPHTHALENE	0.007855	See footnote a	2,647.34	20.8
2302002300	Flat Griddle Frying	PAH, TOTAL	0.015412	See footnote a	2,647.34	40.8
2302002300	Flat Griddle Frying	PHENANTHRENE	0.003628	See footnote a	2,647.34	9.6
2302002300	Flat Griddle Frying	PYRENE	0.001878	See footnote a	2,647.34	5.0
2302002400	Clamshell Griddle Frying	VOC	0.036472	See footnote a	1,066.17	38.9
2302002400	Clamshell Griddle Frying	PM10-PRI	1.006137	See footnote a	1,066.17	1,072.7
2302002400	Clamshell Griddle Frying	PM25-PRI	0.852257	See footnote a	1,066.17	908.6
2302002500	Deep Fat Frying	VOC	0.129029	See footnote a	9,090.45	1,173.9

a - Composite emission factor developed by dividing national emissions by the national mass of meat and french fries cooked. Emission factors that were used to estimate national emissions are in Tables 1A, 2A, 1B, and 2B of **the EPA document *Methods for Developing a National Emission Inventory for Commercial Cooking Processes: Technical Memorandum*** (Reference 5).

Sample Calculation

Maine used the Dun and Bradstreet data provided by U.S. EPA in Appendix B, "Electronic Appendix Containing Data Sets Used to Spatially Allocate National Activity Data and Emissions to Counties," from

Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version.

The following sample calculations illustrate the VOC emissions calculations for one type of cooking device (Deep Fat Fryers), for one type of restaurant (family restaurants) and in one county in Maine (Cumberland County).

Step 1: Calculate the total number of deep fat fryers in Cumberland County.

(A) Calculate the number of deep fat fryers at each restaurant type in Cumberland County.

$$E_{family,dff} = N_{family(cy)} \times f_{family,dff} \times N_{family,dff}$$

where: $E_{family,dff}$ is the total number of deep fat fryers at family restaurants,

$N_{family(cy)}$ is the total number of family restaurants in Cumberland

$f_{family,dff}$ is the fraction of family restaurants with deep fat fryers (from

$N_{family,dff}$ is the average number of deep fat fryers at family restaurants

Example: 23 Family food restaurants in Cumberland County X 91.4% of family restaurants have deep fat fryers X 2.34 deep fat fryers per family restaurant = 49.19 deep fat fryers at family restaurants in Cumberland County.

(B) Calculate the total number of deep fat fryers at all restaurant types in Cumberland County.

$$E_{all,dff} = E_{ethnic,dff} + E_{family,dff} + E_{fast,dff} + E_{seafood,dff} + E_{stk-bbq,dff}$$

where: $E_{all,dff}$ is the total number of deep fat fryers in Cumberland County,

$E_{ethnic,dff}$ is the number of deep fat fryers at ethnic restaurants in

$E_{family,dff}$ is the number of deep fat fryers at family restaurants in

$E_{fast,dff}$ is the number of deep fat fryers at fast food restaurants in

$E_{seafood,dff}$ is the number of deep fat fryers at seafood restaurants in

$E_{stk-bbq,dff}$ is the number of deep fat fryers at steak and barbecue restaurants

Example: 122.82 deep fat fryers at ethnic restaurants + 345.09 deep fat fryers at fast food restaurants + 49.19 deep fat fryers at family restaurants + 83.98 deep fat fryers at seafood restaurants + 4.01 deep fat fryers at steak and barbecue restaurants = 605.09 deep fat fryers in Cumberland County.

Step 2: Calculate emissions from deep fat fryers in Cumberland County.

(A) Calculate the composite amount of meat cooked, expressed in tons per year (tpy).

$$M_{all} = (M_{steak} + M_{hamb} + M_{poultry-skin} + M_{poultry-noskin} + M_{pork} + M_{seafood} + M_{other}) \times \frac{52weeks}{year} \times \frac{ton}{2000lbs.}$$

where: M_{all} is the composite amount of meat cooked in a single deep fat fryer,

M_{steak} is the average weekly pounds of steak cooked in a single deep fat

M_{hamb} is the average weekly pounds of hamburger cooked in a single deep

$M_{poultry-skin}$ is the average weekly pounds of poultry with skin cooked in a

$M_{poultry-noskin}$ is the average weekly pounds of skinless poultry cooked in a

M_{pork} is the average weekly pounds of pork cooked in a single deep fat

$M_{seafood}$ is the average weekly pounds of seafood cooked in a single deep

M_{other} is the average weekly pounds of other meat and french fries cooked

Example: 181 pounds of steak per week + 274 pounds of hamburger per week + 365 pounds of poultry with skin per week + 208 pounds of skinless poultry per week + 58.6 pounds of pork per week + 159 pounds of seafood per week + 274 pounds of other meat and french fries per week X (52 weeks/year) X (1 ton/2,000 pounds) = 39.5096 tons per year of meat per single deep fat fryer.

(B) Calculate VOC emissions from deep fat fryers in Cumberland County.

$$EM_{VOC,dff} = (EF_{VOC,dff} \times M_{all} \times E_{all,dff}) \times \frac{1ton}{2{,}000lbs.}$$

where: $EM_{VOC,dff}$ is the VOC emissions from deep fat fryers in Cumberland

$EF_{VOC,dff}$ is the emissions factor for VOCs from deep fat frying,

M_{all} is the composite amount of meat cooked in a single deep fat fryer,

$E_{all,dff}$ is the total number of deep fat fryers in Cumberland County.

Example: 0.129029 lbs/ton X 39.5096 tons of meat per year X 605.09 deep fat fryers in Cumberland County X 1/2000 ton/lbs = 1.54 tons per year of VOC emissions.

Areas for Improvement

Maine has some concerns about seasonal variability. We could find no guidance to proportion restaurants open year-round vs. those operated seasonally. For that reason, we believe the emissions may be overestimated, especially in the coastal counties.

References

1. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Documentation for the 2002 Nonpoint Source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version, Emission Factor and Inventory Group (D205-01), prepared by E.H. Pechan & Associates, Inc., Research Triangle Park, NC, March 30, 2004.

2. Zapdata.com, a division of D&B Sales and Marketing Solutions, Industry Reports for *Market analysis by state* and *Market analysis by specialty*, April 2004.

3. Public Research Institute, *Charbroiling Activity Estimation, Draft Report*, prepared for California Environmental Protection Agency, California Air Resources Board, March 2003.

4. Dun & Bradstreet, *MarketPlace* CD-ROM, Jan-Mar, 2002.

5. U.S. Department of Agriculture, “U.S. Pack of Frozen Potato Products,” American Frozen Food Institute, 2001.

6. G. Lucier, U.S. Department of Agriculture, personal communication with P. Hemmer, E.H. Pechan & Associates, Inc., May 2003.

7. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Methods for Developing a National Emission Inventory for Commercial Cooking Processes: Technical Memorandum*, prepared by E.H. Pechan & Associates, Inc., Research Triangle Park, NC. September 2003.

8. South Coast Air Quality Management District (SCAQMD), Perryman, Pamela and Peter Votlucka, “Staff Report for Proposed Rule 1138 - Control of Emissions from Restaurant Operations,” October 10, 1997.

5.5 FUEL COMBUSTION

5.5.1 Fuel Combustion - Industrial Sources

Maine DEP contact: Richard Greves (207)287-2437 or Rich.Greves@Maine.gov

For EPA's preliminary 2002 NEI estimates for these source categories, EPA intends to bring forward the 1999 NEI estimates. This is because the necessary activity data from the Census County Business Patterns was not available at least until April of 2004. EPA has not provided 1999 NEI documentation for CAP or HAP emissions from these source categories. Therefore, Maine DEP was unable to review the calculation methodologies.

Industrial fuel combustion includes emissions from the following source categories.

Source Category	SCC
Industrial Fuel Combustion: Bituminous/ Subbituminous Coal (Total: All Boiler Types)	2102002000
Industrial Fuel Combustion: Distillate Oil (Total: Boilers and IC Engines)	2102004000
Industrial Fuel Combustion: Liquified Petroleum Gas (LPG) (Total: All Boiler Types)	2102007000
Industrial Fuel Combustion: Natural Gas (All Boiler Types)	2102006001
Industrial Fuel Combustion: Natural Gas (All IC Engine Types)	2102006002
Industrial Fuel Combustion: Natural Gas (T otal: Boilers and IC Engines)	2102006000
Industrial Fuel Combustion: Residual Oil (Total: All Boiler Types)	2102005000

5.5.1.1 HAPS

The Maine reporting thresholds for HAPs are lower than the federal standards. However, Maine DEP does not enforce the regulations that require the reporting of HAPs from combustion sources, so there are a significant number of facilities that did not report in 2002. In the future, Maine DEP will consider calculating HAP emissions from this source category, based on activity data in Maine's i-STEPS® database and emission factors from EPA's MACT regulation development program.

5.5.1.2 CAPs

Most of the CAPs from industrial fuel combustion are captured in Maine's Point Source Inventory, since Maine has lower reporting thresholds than in the federal regulations. Therefore, Maine reports zero CAP emissions for the above area source categories, as these emissions are included in the point source inventory.

5.5.2 Fuel Combustion - Institutional and Commercial Sources

Maine DEP contact: Richard Greves (207)287-2437 or Rich.Greves@Maine.gov

Maine has accepted the methodology used by EPA to calculate emissions from fuel combustions in the 1999 inventory. At the time of the development of the preliminary NEI, the data for 2002 fuel use had not been published by the Energy Information Association of the Department of Energy. Therefore, EPA brought forward the estimates from 1999. Maine DEP did not have any other source of activity data, so Maine accepted the methodology used by EPA to calculate emissions from fuel combustion in the 1999 inventory. Maine DEP has not reviewed the calculations themselves for errors.

Institutional and commercial fuel combustion includes emissions from the following source categories.

Source Category	SCC
Institutional and Commercial Heating: Anthracite Coal	2103001000
Institutional and Commercial Heating: Bituminous/Sub-bituminous Coal	2103002000
Institutional and Commercial Heating: Distillate Oil	2103004000
Institutional and Commercial Heating: Natural Gas	2103006000
Institutional and Commercial Heating: Residual Oil	2103005000

The criteria pollutants resulting from combustion of fuels at the larger state facilities are included with the Maine DEP point source inventory submission. However, not all facilities report their HAP emissions from the combustion of fuel. Because Commercial/Institutional fuel use activity data was unavailable, Maine DEP used fuel use data from 2000 to estimate HAP emissions. Fuel use data is available from the US Census Bureau's County Business Pattern and can be accessed at the Census Website at: http://www.census.gov/epcd/cbp/view/cbpview.html. Maine DEP should coordinate with EPA's Office of Quality Planning and Standards to determine if EPA will be running these calculations and avoid duplication of effort.

5.5.2.1 Institutional/Commercial Heating: Anthracite Coal

Maine will no longer be including emissions from institutional/commercial heating: anthracite coal (SCC: 2103001000) in the National Emissions Inventory.

AP-42, Section 1.2.1 states:

> "In the U.S., nearly all anthracite is mined in northeastern Pennsylvania and consumed in Pennsylvania and its surrounding states. The only significant amount of anthracite is used for steam/electric production. Anthracite currently accounts for only a small fraction of the total quantity of coal combusted in the U.S. The anthracite burned is primarily reclaim from old production as no new anthracite is mined."

Thus, Maine DEP believes that no anthracite coal is used in Maine. Any emissions attributed to SCC code 2103001000 have been deleted from the inventory.

5.5.2.2 Institutional/Commercial Heating: Bituminous/Sub-bituminous Coal

5.5.2.2.1 HAPs

EPA's did not document any calculation methods for HAP emissions in the 1999 NEI documentation. Maine DEP believes that the emission factors used for residential coal combustion, as found in Appendix A of "Documentation for the Final 1999 Nonpoint Area Source National Emissions Inventory for Hazardous Air Pollutants (Version 3.0)," are inaccurate. Therefore, estimates for Institutional/Commercial Heating: Bituminous/Sub-bituminous Coal (SCC: 2103002000) have been removed from the final 2002 NEI submission. Since the numbers which EPA carried over from the 1999 NEI are so insignificant, Maine DEP believes that omitting them from the database has little or no impact.

5.5.2.2.2 CAPs

CAP emissions from Institutional/Commercial Heating: Bituminous/Sub-bituminous Coal are captured by Maine's point inventory, since Maine has lower reporting thresholds than the federal standards require. Also, no CAP emission factors were located, therefore, CAP emissions are assumed to be zero for this category.

5.5.2.3 Institutional/Commercial Heating: Distillate Oil

Maine DEP has performed its own calculations and are submitting emission estimates for Institutional/Commercial Heating: Distillate Oil (SCC: 2103004000).

5.5.2.3.1 HAPs

Methodology

EPA's calculation method for HAP emissions for the 1999 NEI are quoted directly from: Appendix A of "Documentation for the Final 1999 Nonpoint Area Source National Emissions Inventory for Hazardous Air Pollutants (Version 3.0)."

The activity data used for calculating the HAP estimates for institutional/commercial sources heating distillate oil was taken from the Energy Information Administration(1). In 1999, 417 million MMBTUs of distillate oil were consumed for institutional/commercial heating.

The Emission Standards Division (2) supplied emission factors for acetaldehyde, arsenic, benzene, beryllium, cadmium, chromium, formaldehyde, lead, manganese, mercury, nickel, selenium, and fifteen individual PAHs (acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(b,k) fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) (Table 5.5.2.3.1-A).

Emissions were allocated to the county-level by the county proportion of national employment as reported to the 1999 County Business Patterns (3) for numerous SIC codes relating to institutional/commercial sources. Refer to Appendices C and E for more details on this allocation.

Sample Calculation

National Emissions (tons/year) = [Emission Factor (lb/MM Btu Oil)*National Activity Level (MM Btu oil burned/year)] / 2000 (lb/ton)

National pyrene emissions = (0.00000003*417000000)/2000 = .0063

Emission Factors

Table 5.5.2.3.1.-A: HAP Emission Factors for Institutional/Commercial Heating: Distillate Oil

Pollutant	Emission Factor (lb/MMBTU Oil)	Emission Factor Reference	National Activity Level (Reference 1) (MMBTU oil burned year)	National Emissions (tons/year)
acenaphthene	1.50E-07	Reference 2, 3	4.17E+08	3.14E-02
acenaphtylene	1.80E-09	Reference 2, 3	4.17E+08	3.76E-04
acetaldehyde	3.50E-05	Reference 2	4.17E+08	7.29E+00
anthracene	8.70E-09	Reference 2, 3	4.17E+08	1.82E-03
arsenic	4.00E-06	Reference 2, 3	4.17E+08	8.33E-01
benz(a)anthracene	2.90E-08	Reference 2, 3	4.17E+08	5.97E-03
benzene	1.50E-06	Reference 2, 3	4.17E+08	3.12E-01

Pollutant	Emission Factor (lb/MMBTU Oil)	Emission Factor Reference	National Activity Level (Reference 1) (MMBTU oil burned year)	National Emissions (tons/year)
benzo(b,k)fluoranthene	1.10E-08	Reference 2, 3	4.17E+08	2.20E-03
benzo(g,h,i)perylene	1.60E-08	Reference 2, 3	4.17E+08	3.36E-03
beryllium	3.00E-06	Reference 2, 3	4.17E+08	6.25E-01
cadmium	3.00E-06	Reference 2, 3	4.17E+08	6.25E-01
chromium	3.00E-06	Reference 2, 3	4.17E+08	6.25E-01
chrysene	1.70E-08	Reference 2, 3	4.17E+08	3.54E-03
dibenzo(a,h)anthracene	1.20E-08	Reference 2, 3	4.17E+08	2.48E-03
fluoranthene	3.50E-08	Reference 2, 3	4.17E+08	7.20E-03
fluorene	3.20E-08	Reference 2, 3	4.17E+08	6.65E-03
formaldehyde	2.40E-04	Reference 2, 3	4.17E+08	5.00E+01
indeno(1,2,3-cd)pyrene	1.50E-08	Reference 2, 3	4.17E+08	3.18E-03
lead	9.00E-06	Reference 2, 3	4.17E+08	1.87E+00
manganese	6.00E-06	Reference 2, 3	4.17E+08	1.25E+00
mercury	3.00E-06	Reference 2, 3	4.17E+08	6.25E-01
naphthalene	8.10E-06	Reference 2, 3	4.17E+08	1.68E+00
nickel	3.00E-06	Reference 2, 3	4.17E+08	6.25E-01
phenanthrene	7.50E-08	Reference 2, 3	4.17E+08	1.56E-02
pyrene	3.00E-08	Reference 2, 3	4.17E+08	6.32E-03
selenium	1.50E-05	Reference 2, 3	4.17E+08	3.12E+00

5.5.2.3.2 CAPs

The bulk of the CAP emissions from Institutional/Commercial Heating: Distillate Oil are captured by Maine's point inventory, since Maine has lower reporting thresholds than the federal standards require. Because fuel use activity data was unavailable, Maine DEP used fuel use data from 2000 to estimate HAP emissions. Fuel use data is available from the US Census Bureau's County Business Pattern and can be accessed at the Census Website at: http://www.census.gov/epcd/cbp/view/cbpview.html. Maine DEP should coordinate with EPA's Office of Quality Planning and Standards to determine if EPA will be running these calculations and avoid duplication of effort.

References

1. Energy Information Administration (EIA). State Energy Data Report, 1999 Summaries. Consumption Estimates. U.S. Department of Energy, Washington, D.C., May, 2001.Internet Address: http://www.eia.doe.gov/emeu/sedr/contents.html

2. Porter, Fred, U.S. Environmental Protection Agency, Emission Standards Division. Note to Anne Pope, U.S. EPA/Emissions Monitoring and Analysis Division. Comments on Commercial/Institutional Heating information in the "Baseline Emission Inventory of HAP Emissions from MACT Sources -- Interim Final Report," September 18, 1998. November13, 1998.

3. County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001.

5.5.2.4 Institutional/Commercial Heating: Natural Gas

Maine DEP has performed its own calculations and are submitting emission estimates for Institutional/Commercial Heating: Natural Gas (SCC: 2103006000).

5.5.2.4.1 HAPs

Methodology

EPA's calculation method for HAP emissions for the 1999 NEI is quoted directly from Appendix A of "Documentation for the Final 1999 Nonpoint Area Source National Emissions Inventory for Hazardous Air Pollutants (Version 3.0)."

The activity data for institutional/commercial sources heating natural gas comes from the Energy Information Administration(1). In 1999, 3.14 billion MMBTUs of natural gas were consumed for institutional/commercial heating.

The Emission Standards Division (2) provided emission factors for acetaldehyde, benzene, formaldehyde, and five individual PAHs (fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene).

Emissions were allocated to the county-level by the county proportion of national employment as reported to the 1999 County Business Patterns (3) for numerous SIC codes relating to institutional/commercial sources. Refer to Appendices C and E for more details on this allocation.

Sample Calculation

National Emissions (tons/year) = [Emission Factor (lb/MM NG burned)*National Activity Level (MM NG burned/year)] / 2000 (lb/ton)

National pyrene emissions = (0.000000005*3140000000)/2000 = .00784

Emission Factors

Table 5.5.2.4.1.-A HAP Emission Factors for Institutional/Commercial Heating: Natural Gas

Pollutant	Emission Factor (lb/MMBtu NG	Emission Factor Reference	National Activity Level (Reference 1) (MMBtu NG burned/year	National emissions (ton/year)
acetaldehyde	1.30E-08	Reference 2	3.14E+09	2.04E-02
benzene	2.10E-06	Reference 2, 3	3.14E+09	3.29E+00
formaldehyde	7.50E-05	Reference 2, 3	3.14E+09	1.18E+02
fluoranthene	3.00E-09	Reference 2, 3	3.14E+09	4.70E-03
fluorene	2.80E-09	Reference 2, 3	3.14E+09	4.39E-03
naphthalene	6.10E-07	Reference 2, 3	3.14E+09	9.56E-01
phenanthrene	1.70E-08	Reference 2, 3	3.14E+09	2.67E-02
pyrene	5.00E-09	Reference 2, 3	3.14E+09	7.84E-03

5.5.2.4.2 CAPs

CAP emissions from Institutional/Commercial Heating: Natural Gas are captured by Maine's point inventory, since Maine has lower reporting thresholds than the federal standards require. Also, no CAP emission factors were located, therefore, CAP emissions are assumed to be zero for this category.

<u>References</u>

1. Energy Information Administration (EIA). State Energy Data Report, 1999 Summaries. Consumption Estimates. U.S. Department of Energy, Washington, D.C., May, 2001. Internet Address:http://www.eia.doe.gov/emeu/sedr/contents.html

2. Porter, Fred, U.S. Environmental Protection Agency, Emission Standards Division. Note to Anne Pope, U.S. EPA/Emissions Monitoring and Analysis Division. Comments on Commercial/Institutional Heating information in the "Baseline Emission Inventory of HAP Emissions from MACT Sources -- Interim Final Report," September 18, 1998. November 13, 1998.

3. County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001.

5.5.2.5 Institutional/Commercial Heating: Residual Oil

Maine has removed all emissions from Institutional/Commercial Heating: Residual Oil (SCC: 2103005000).

5.5.3 Institutional/Commercial Fuel Combustion: Public Owned Treatment Works (POTW) Digester Gas

There are no facilities combusting digester gases in Maine. Therefore, the emissions from this source category are zero.

5.5.4 Fuel Combustion: Orchard Heaters

Maine will no longer be including emissions from orchard heaters (SCC: 2801520000) as an area source category in the National Emissions Inventory. In 1999, a telephone survey by Maine Department of Agriculture to the major orchards in Maine revealed that orchard heaters are not used in Maine.

This information was confirmed by the Maine Department of Agriculture. We have never reported emissions in this category (PEI 1990-1999).

5.5.5 Fuel Combustion: Residential Heating

Maine has reviewed and accepts EPA's methodology for estimating emissions from residential fuel combustion, except for Residential Heating: Wood/Wood Residue, as presented in EPA's preliminary 2002 NEI. Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

The following descriptions of calculation methodology are quoted from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version," Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis

Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Institutional and commercial fuel combustion includes emissions from the following source categories.

Source Category	SCC
Residential Heating: Anthracite Coal	2104001000
Residential Heating: Bituminous/Sub-bituminous Coal	2104002000
Residential Heating: Distillate Oil	2104004000
Residential Heating: Natural Gas	2104006000
Residential Heating: Residual Oil	2104005000
Residential Heating: Wood/Wood Residue	2104008001 2104008002 2104008003 2104008004 2104008010 2104008030 2104008050

5.5.5.1 Residential Heating: Anthracite Coal and Bituminous/Sub-bituminous Coal

Maine DEP Contact: Doug Saball (207)287-8123 or Doug.Saball@maine.gov

Methodology

The mass of coal consumed for residential heating in the U.S. is used to estimate emissions. Coal consumption by energy use sector is presented in the State Energy Data 2000 Consumption published by the Energy Information Administration (EIA) (1). Year 2000 consumption data (452 thousand tons) were used to estimate 2002 consumption because year 2000 data were the latest data available.

The State Energy Data Report does not distinguish between anthracite and bituminous coal consumption estimates. EPA's report "Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion," uses State-level anthracite and bituminous coal consumption (2) estimates for 1999 that were obtained directly from EIA. The 1999 ratio of anthracite and bituminous coal consumption to total coal consumption is used to distribute the 2000 coal consumption data by coal type. Table 5.5.5.1-A presents the 1999 ratio between anthracite and bituminous coal consumption in each State.

Table 5.5.5.1-A. 1999 State Distribution of Anthracite and Bituminous Coal Consumed for Residential Heating [Maine Excerpt only]

State	Ratio of Bituminous	Ratio of Anthracite
Maine	0.00000	1.00000

State-level coal consumption was allocated to each county using the U.S. Census Bureau's 2000 Census Detailed Housing Information (3). These data include the number of housing units using a specific type of fuel for residential heating. Appendix B provides these data in database format. State coal consumption was allocated to each county using the ratio of the number of houses burning coal in each county to the total number of houses burning coal in the State. Refer to Appendices B and C for more details on this allocation.

Calculation of SO_2 and PM emissions requires sulfur content and ash content of the coal burned. Table 5.5.5.1-B presents SO_2 and sulfur content of PM emission factors for anthracite and bituminous coal. State-specific sulfur and ash content of anthracite and bituminous coal is obtained from EPA's report

"Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion."(2) This report presents an analysis of the sulfur content and ash content in each state with a coal seam based on data obtained from USGS COALQUAL database. States that are not included in the database but reported coal usage are assigned values based on their proximity to coal seams or using an average value for Pennsylvania (see report for details of the analysis). Table 5.5.5.1-C presents the sulfur and ash content by coal type for each State.

Table 5.5.5.1-B. Emission Factors for Residential Anthracite and Bituminous Coal Combustion

Pollutant	Emission Factor (lb/ton)	AP-42 Table
Anthracite Emission Factors		
SO_2	39 x % Sulfur	1.2-1
PM_{10} (Filterable)	10.0	1.2-3
$PM_{2.5}$ (Filterable)	0.6 x % Ash	1.2-4
PM Condensible	0.08 x % Ash	1.2-3
Bituminous Emission Factors		
SO_2	31 x % Sulfur	1.1-3
PM_{10} (Filterable)	6.2	1.1-4
$PM_{2.5}$ (Filterable)	3.8	1.1-10
PM Condensible	0.04	1.1-5

Note: PM_{10}, $PM_{2.5}$, and condensable PM emission factors for bituminous coal do not require ash content.

Table 5.5.5.1-C. State-Specific Sulfur and Ash Content for Anthracite and Bituminous Coal [Maine Excerpt only]

Anthracite	Bituminous					
State	Percent Ash Content	Percent Sulfur Content	State	Percent Sulfur Content	State	Percent Sulfur Content
Maine	13.38	0.89				

The remaining criteria pollutant and HAP emissions were calculated by multiplying the total coal consumed in each county per year by an emission factor. Emissions for anthracite and bituminous coal were calculated separately, since emission factors vary by coal type. Table 5.5.5.1-D presents a summary of the CAP emissions factors, total mass of coal burned and the national CAP emissions. Table 5.5.5.1-E presents HAP emissions factors, total mass of coal burned and the national HAP emissions. Emissions from residential heating by coal in the Puerto Rico and the U.S. Virgin Islands were not estimated for the 2002 NEI.

Table 5.5.5.1-D. National Criteria Pollutant Emissions Summary for Residential Heating with Anthracite and Bituminous Coal

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	National Activity Level (thousand Short tons)	National Emissions (tons/yr)
Anthracite				
CO	275	Reference 2	74.45	10,237
NOX	3	Reference 2	74.45	112
PM10-FIL	See Table 2	Reference 2	74.45	4,989
PM-CON	See Table 2	Reference 2	74.45	39.9
PM25-FIL	See Table 2	Reference 2	74.45	299
SO2	See Table 2	Reference 2	74.45	1,291
VOC	10	Reference 2	74.45	372

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	National Activity Level (thousand Short tons)	National Emissions (tons/yr)
Bituminous				
CO	275	Reference 2	377.55	51,913
NOX	9.1	Reference 2	377.55	1,718
PM10-FIL	6.2	Reference 2	377.55	1,170
PM25-FIL	3.8	Reference 2	377.55	717
PM-CON	0.04	Reference 2	377.55	7.6
SO2	See Table 2	Reference 2	377.55	11,388
VOC	10	Reference 2	377.55	1,888

Table 5.5.5.1-E. National HAP Emissions Summary for Residential Heating with Anthracite and Bituminous Coal

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	National Activity Level (thousand short tons)	National Emissions (tons/yr)
Anthracite				
Acenaphthene	5.10e-07	5	74.45	1.90e-05
Acenaphthylene	2.50e-07	5	74.45	9.31e-06
Acetaldehyde	5.70e-04	4,5	74.45	2.12e-02
Acetophenone	1.50e-05	4,5	74.45	5.58e-04
Acrolein	2.90e-04	4,5	74.45	1.08e-02
Anthracene	2.10e-07	5	74.45	7.82e-06
Antimony	1.80e-05	4,5	74.45	6.70e-04
Arsenic	4.10e-04	4,5	74.45	1.53e-02
Benz[a]Anthracene	8.00e-08	5	74.45	2.98e-06
Benzene	1.30e-03	4,5	74.45	4.84e-02
Benzo[a]Pyrene	3.80e-08	5	74.45	1.41e-06
Benzo[g,h,i,]Perylene	2.70e-08	5	74.45	1.01e-06
Benzofluoranthenes	1.10e-07	5	74.45	4.09e-06
Beryllium	2.10e-05	4,5	74.45	7.82e-04
Bis(2-Ethylhexyl)Phthalate	7.30e-05	4,5	74.45	2.72e-03
Cadmium	5.10e-05	4,5	74.45	1.90e-03
Carbon Disulfide	1.30e-04	4,5	74.45	4.84e-03
Chlorobenzene	2.20e-05	4,5	74.45	8.19e-04
Chromium	2.64e-04	4,5	74.45	9.83e-03
Chrysene	1.00e-07	5	74.45	3.72e-06
Cobalt	1.00e-04	4,5	74.45	3.72e-03
Dioxins/Furans as 2,3,7,8-TCDD TEQs - I/89	4.20e-15	6	74.45	1.56e-13
Ethyl Benzene	9.40e-05	4,5	74.45	3.50e-03
Ethylene Dichloride	4.00e-05	4,5	74.45	1.49e-03
Fluoranthene	7.10e-07	5	74.45	2.64e-05
Fluorene	9.10e-07	5	74.45	3.39e-05
Formaldehyde	2.40e-04	4,5	74.45	8.93e-03
Hexane	6.70e-05	4,5	74.45	2.49e-03
Hydrochloric Acid	1.20e+00	4,5	74.45	4.47e+01
Hydrogen Fluoride	1.50e-01	5	74.45	5.58e+00
Indeno[1,2,3-c,d]Pyrene	6.10e-08	5	74.45	2.27e-06
Isophorone	5.80e-04	4,5	74.45	2.16e-02
Lead	4.20e-04	4,5	74.45	1.56e-02
Manganese	4.90e-04	4,5	74.45	1.82e-02
Mercury	8.30e-05	4,5	74.45	3.09e-03
Methyl Bromide	1.60e-04	4,5	74.45	5.96e-03
Methyl Chloride	5.30e-04	4,5	74.45	1.97e-02
Methyl Ethyl Ketone	3.90e-04	4,5	74.45	1.45e-02
Methylene Chloride	2.90e-04	4,5	74.45	1.08e-02
Naphthalene	1.30e-05	5	74.45	4.84e-04
Nickel	2.80e-04	4,5	74.45	1.04e-02
Phenanthrene	2.70e-06	5	74.45	1.01e-04
Phenol	1.60e-05	5	74.45	5.96e-04
Propionaldehyde	3.80e-04	4,5	74.45	1.41e-02
Pyrene	3.30e-07	5	74.45	1.23e-05

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	National Activity Level (thousand short tons)	National Emissions (tons/yr)
Selenium	1.30e-03	4,5	74.45	4.84e-02
Styrene	2.50e-05	4,5	74.45	9.31e-04
Tetrachloroethylene	4.30e-05	4,5	74.45	1.60e-03
Toluene	2.40e-04	4,5	74.45	8.93e-03
Bituminous				
Acetaldehyde	5.70e-04	4,5	377.55	1.08e-01
Acetophenone	1.50e-05	4,5	377.55	2.83e-03
Acrolein	2.90e-04	4,5	377.55	5.47e-02
Antimony	1.80e-05	4,5	377.55	3.40e-03
Arsenic	4.10e-04	4,5	377.55	7.74e-02
Benz[a]Anthracene	8.00e-08	5	377.55	1.51e-05
Benzene	1.30e-03	4,5	377.55	2.45e-01
Benzo[b]Fluoranthene	1.10e-07	5	377.55	2.08e-05
Benzo[g,h,i,]Perylene	2.70e-08	5	377.55	5.10e-06
Beryllium	2.10e-05	4,5	377.55	3.96e-03
Bis(2-Ethylhexyl)Phthalate	7.30e-05	4,5	377.55	1.38e-02
Cadmium	5.10e-05	4,5	377.55	9.63e-03
Carbon Disulfide	1.30e-04	4,5	377.55	2.45e-02
Chlorobenzene	2.20e-05	4,5	377.55	4.15e-03
Chromium	2.60e-04	4,5	377.55	4.91e-02
Chrysene	1.00e-07	4	377.55	1.89e-05
Cobalt	1.00e-04	4,5	377.55	1.89e-02
Dioxins/Furans as 2,3,7,8-TCDD TEQs - I/89	1.50e-14	6	377.55	2.83e-12
Ethyl Benzene	9.40e-05	4,5	377.55	1.77e-02
Ethylene Dichloride	4.00e-05	4,5	377.55	7.55e-03
Formaldehyde	2.40e-04	4,5	377.55	4.53e-02
Hexane	6.70e-05	4,5	377.55	1.27e-02
Indeno[1,2,3-c,d]Pyrene	6.10e-08	5	377.55	1.15e-05
Isophorone	5.80e-04	4,5	377.55	1.09e-01
Lead	4.20e-04	4,5	377.55	7.93e-02
Manganese	4.90e-04	4,5	377.55	9.25e-02
Mercury	8.30e-05	4,5	377.55	1.57e-02
Methyl Bromide	1.60e-04	4,5	377.55	3.02e-02
Methyl Chloride	5.30e-04	4,5	377.55	1.00e-01
Methyl Ethyl Ketone	3.90e-04	4,5	377.55	7.36e-02
Methylene Chloride	2.90e-04	4,5	377.55	5.47e-02
Nickel	2.80e-04	4,5	377.55	5.29e-02
Phenol	1.60e-05	5	377.55	3.02e-03
Propionaldehyde	3.80e-04	4,5	377.55	7.17e-02
Pyrene	3.30e-07	5	377.55	6.23e-05
Selenium	1.30e-03	4,5	377.55	2.45e-01
Styrene	2.50e-05	4,5	377.55	4.72e-03
Tetrachloroethylene	4.30e-05	4,5	377.55	8.12e-03
Toluene	2.40e-04	4,5	377.55	4.53e-02

Example Calculations

$$\textit{National Emissions}\left(\frac{tons}{year}\right) = \frac{\textit{Emission Factor}\left(\frac{lb}{ton\ coal}\right) \times \textit{National Activity}\left(\frac{tons\ coal\ burned}{year}\right)}{2000\ \frac{lb}{ton}}$$

$$\textit{National selenium emissions} \text{ from bituminous coal combustion} = \frac{\frac{1.3\times 10^{-3}\ lb}{ton} \times 377.55\times 10^{3}\ ton}{2000\ \frac{tons}{yr}} = .024541\ tons$$

References:

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2000 Consumption. Washington, D.C. 2003. Internet Address: http://www.eia.doe.gov/emeu/states/_use_multistate.htm

2. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. “Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion.” Research Triangle Park, NC. September 2002. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/drat1999_residfuel_inven_apr2003.zip

3. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3, [Data file], March, 2003.

4. Porter, Fred, U.S. Environmental Protection Agency, Emission Standards Division. Note to Anne Pope, U.S. Environmental Protection Agency/Emissions Monitoring and Analysis Division. Comments on Industrial Boiler information in the “Baseline Emission Inventory of HAP Emissions from MACT Sources – Interim Final Report,” September 18, 1998. November 13, 1998.

5. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

6. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. “Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and NonPoint Source Dioxin Inventories.” Prepared by E.H. Pechan & Associates. Research Triangle Park, NC. May 2003.”

5.5.5.2 Residential Heating: Distillate Oil

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Methodology

The State-level volume of distillate oil consumed for residential heating in the U.S. is used to estimate emissions. Distillate Oil consumption by energy use sector is presented in the State Energy Data 2000 Consumption published by the Energy Information Administration (EIA) (1). Because 2002 consumption data were not yet available, year 2000 consumption data (6,175,092 thousand gallons) were used to estimate 2002 consumption.

State-level distillate oil consumption was allocated to each county using the U.S. Census Bureau's 2000 Census, Detailed Housing Information (2). These data include the number of housing units using a specific type of fuel for residential heating. Appendix B provides these data in database format. State distillate oil consumption was allocated to each county using ratio of number of houses burning distillate oil in each county to the total number of houses burning distillate oil in the state.

Criteria pollutant emission factors for distillate oil are from "Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion."(3) For all counties in the U.S., the distillate oil consumed for residential heating is assumed to be No. 2 fuel oil with a heating value of 140,000 Btu per gallon and a sulfur content of 0.30%.(3) County-level criteria pollutant and HAP emissions were calculated by multiplying the total distillate oil consumed in each county per year by an emission factor. Table 5.5.5.2-A is a national summary of the emissions data that contains the emissions factors, total volume of distillate oil burned, and national criteria pollutant and HAP emissions from residential heating with distillate oil. Emissions from residential heating by distillate oil in the Puerto Rico and the U.S. Virgin Islands were not estimated for the 2002 NEI.

Table 5.5.5.2-A. National Criteria Pollutant and HAP Emissions Summary for Residential Heating with Distillate Oil

Pollutant	Emission Factor (lb/1,000 gal)	Emission Factor Reference	National Activity Level Distillate Oil Consumption (thousand gallons)	National Emissions (lb/yr)
Acenaphthene	2.11e-05	5	6,175,092	6.51E-02
Acenaphthylene	2.53e-07	5	6,175,092	7.81E-04
Acetaldehyde	4.92e-03	5	6,175,092	1.52E+01
Anthracene	1.22e-06	5	6,175,092	3.77E-03
Arsenic	5.62e-04	4, 5	6,175,092	1.73E+00
Benz[a]Anthracene	4.07e-06	5	6,175,092	1.26E-02
Benzene	2.11e-04	4, 5	6,175,092	6.51E-01
Benzo[b+k]Fluoranthene	1.55e-06	5	6,175,092	4.77E-03
Benzo[g,h,i,]Perylene	2.25e-06	5	6,175,092	6.94E-03
Beryllium	4.21e-04	4, 5	6,175,092	1.30E+00
Cadmium	4.21e-04	4, 5	6,175,092	1.30E+00
Chromium	4.21e-04	4, 5	6,175,092	1.30E+00
Chrysene	2.39e-06	5	6,175,092	7.37E-03
Dibenzo[a,h]Anthracene	1.69e-06	5	6,175,092	5.20E-03
Fluoranthene	4.92e-06	5	6,175,092	1.52E-02
Fluorene	4.50e-06	5	6,175,092	1.39E-02
Formaldehyde	3.37e-02	4, 5	6,175,092	1.04E+02
Indeno[1,2,3-c,d]Pyrene	2.11e-06	5	6,175,092	6.51E-03
Lead	1.26e-03	4, 5	6,175,092	3.90E+00
Manganese	8.43e-04	4, 5	6,175,092	2.60E+00
Mercury	4.21e-04	4, 5	6,175,092	1.30E+00
Naphthalene	1.14e-03	5	6,175,092	3.51E+00
Nickel	4.21e-04	4, 5	6,175,092	1.30E+00

Pollutant	Emission Factor (lb/1,000 gal)	Emission Factor Reference	National Activity Level Distillate Oil Consumption (thousand gallons)	National Emissions (lb/yr)
OCDD	5.49e-10	4, 5	6,175,092	1.70E-06
OCDF	2.50e-10	4, 5	6,175,092	7.71E-07
Phenanthrene	1.05e-05	5	6,175,092	3.25E-02
Pyrene	4.21e-06	5	6,175,092	1.30E-02
Selenium	2.11e-03	4, 5	6,175,092	6.51E+00
2,3,7,8-TCDD	4.66e-10	6	6,175,092	1.44E-06
2,3,7,8-TCDF	4.41e-10	6	6,175,092	1.36E-06
Total HpCDD	5.24e-10	6	6,175,092	1.62E-06
Total HpCDF	6.07e-10	6	6,175,092	1.88E-06
Total HxCDD	5.49e-10	6	6,175,092	1.70E-06
Total HxCDF	1.41e-09	6	6,175,092	4.37E-06
Total PeCDD	6.82e-10	6	6,175,092	2.11E-06
Total PeCDF	3.49e-09	6	6,175,092	1.08E-05
CO	5.00e-00	3	6,175,092	1.54E+04
NOX	1.80e+01	3	6,175,092	5.56E+04
PM10-FIL	1.08e+00	3	6,175,092	3.33E+03
PM25-FIL	8.30e-01	3	6,175,092	2.56E+03
PM-CON	1.30e+00	3	6,175,092	4.01E+03
SO2	4.26e+01	3	6,175,092	1.32E+05
VOC	7.00e-01	3	6,175,092	2.16E+03

Sample Calculation

$$National\ Emissions\left(\frac{tons}{year}\right) = \frac{Emission\ Factor\left(\frac{lb}{MM\ Btu\ Oil}\right)\times\frac{0.14\ MMBtu}{gal}\times National\ Activity\left(\frac{gal\ oil\ burned}{year}\right)}{2000\ \frac{lb}{ton}}$$

$$National\ selenium\ emissions = \frac{\frac{1.5\times10^{-5}\ lb}{MMBtu}\times\frac{0.14\ MMBtu}{gal}\times 6{,}175{,}092\times10^{6}\ gal}{2000\ \frac{tons}{yr}} = 6.51\ tons$$

References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2000 Consumption. Washington, D.C. 2003. Internet Address: http://www.eia.doe.gov/emeu/states/_use_multistate.html

2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3, [Data file], March, 2003.

3. U.S. Environmental Protection Agency, Emission Factors and Inventory Group. “Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion.” September 2002. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/drat1999_residfuel_inven_apr2003.zip

4. Porter, Fred, U.S. Environmental Protection Agency, Emission Standards Division. Note to Anne Pope, U.S. Environmental Protection Agency/Emissions Monitoring and Analysis Division. Comments on Industrial Boiler information in the “Baseline Emission Inventory of HAP Emissions from MACT Sources – Interim Final Report,” September 18, 1998. November 13, 1998.

5. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

6. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. “Documentation of Emissions Estimation methods for Year 2000 and 2001 Mobile Source and NonPoint Source Dioxin Inventories.” Prepared by E.H. Pechan & Associates. Research Triangle Park, NC. May 2003.

5.5.5.3 Residential Heating: Natural Gas

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Methodology

The State-level volume of natural gas consumed for residential heating in the United States is used to estimate emissions. Natural gas consumption by energy use sector is presented in the State Energy Data 2000 Consumption published by the EIA(1). Year 2000 consumption data (4,991,678 million cubic feet) were used to estimate 2002 consumption because these data were the latest data available.

State-level natural gas consumption was allocated to each county using the U.S. Census Bureau’s 2000 Census Detailed Housing Information.(2) These data include the number of housing units using a specific type of fuel for residential heating. Appendix B contains the fuel type data in database format. State distillate oil consumption was allocated to each county using ratio of number of houses burning distillate oil in each county to the total number of houses burning distillate oil in the state.

Criteria pollutant emission factors for natural gas are from “Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion.”(3) For all counties in the United States, the natural gas consumed for residential heating is assumed to have a heating value of 1,050 Btu per cubic foot and a sulfur content of 2,000 grains per million cubic feet.(3)

County-level criteria pollutant and HAP emissions were calculated by multiplying the total natural gas consumed in each county per year by an emission factor. Table 5.5.5.3-A is a national summary of the emissions data that contains the emissions factors, total volume of natural gas burned, and national criteria pollutant and HAP emissions from residential heating with natural gas. Emissions from residential heating by natural gas in the Puerto Rico and the U.S. Virgin Islands were not estimated for the 2002 NEI.

Table 5.5.5.3-A. National Criteria Pollutant and HAP Emissions Summary for Residential Heating with Natural Gas

Pollutant	Emission Factor (lb/million cubic ft)	Emission Factor Reference	National Activity Natural Gas (million cubic feet)	National Emissions (tons/yr)
Formaldehyde	7.88e-02	4	4,991,678	1.97e+02
Benzene	2.21e-03	4	4,991,678	5.51e+00
Acetaldehyde	1.37e-05	4	4,991,678	3.41e-02
Pyrene	5.25e-06	5	4,991,678	1.31e-02

Phenanthrene	1.79e-05	5	4,991,678	4.46e-02
Fluoranthene	3.15e-06	5	4,991,678	7.86e-03
Fluorene	2.94e-06	5	4,991,678	7.34e-03
Naphthalene	6.41e-04	5	4,991,678	1.60e+00
CO	4.00E+01	3	4,991,678	9.98E+04
NOX	9.40E+01	3	4,991,678	2.35E+05
PM10-FIL	1.90E+00	3	4,991,678	4.74E+03
PM25-FIL	1.90E+00	3	4,991,678	4.74E+03
PM-CON	5.70E+00	3	4,991,678	1.42E+04
SO2	6.00E-01	3	4,991,678	1.50E+03
VOC	5.50E+00	3	4,991,678	1.37E+04

Sample Calculation

$$\text{National Emissions}\left(\frac{tons}{year}\right)=\frac{\text{Emission Factor}\left(\frac{lb}{MMBtu}\right)\times\frac{1050\ MMBtu}{million\ ft^3}\times \text{National Activity}\left(\frac{million\ ft^3\ nat\ gas}{year}\right)}{2000\ \frac{lb}{ton}}$$

$$\text{National fluorene emissions}=\frac{\frac{2.8\times10^{-9}\ lb}{MMBtu}\times\frac{1050\ MMBtu}{million\ ft^3}\times 4{,}991{,}678\ million\ ft^3}{2000\ \frac{tons}{yr}}=7.34e-03\ tons$$

References

1. U.S. Department of Energy, Energy Information Administration (EIA). State Energy Data 2000 Consumption. Washington, D.C. 2003. Internet Address: http://www.eia.doe.gov/emeu/states/_use_multistate.html

2. U.S. Census Bureau. "Table H40. House Heating Fuel Type", Census 2000: Summary File 3, [Data file], March, 2003.

3. U.S. Environmental Protection Agency. Emission Factor and Inventory Group. Final Summary of the Development and Results of a Methodology for Calculating Area Source Emissions from Residential Fuel Combustion. September 2002. Internet address:
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5. Porter, Fred, U.S. Environmental Protection Agency, Emission Standards Division. Note to Anne Pope, U.S. Environmental Protection Agency/Emissions Monitoring and Analysis Division. Comments on Industrial Boiler information in the “Baseline Emission Inventory of HAP Emissions from MACT Sources – Interim Final Report,” September 18, 1998. November 13, 1998.

6. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, 5th Edition, AP-42, Volume I: Stationary Point and Area Sources. Research Triangle Park, North Carolina. 1996.

5.5.5.4 Residential Heating: Wood/Wood Residue

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Methodology

Maine has poor information regarding the amount of wood burned for residential heating, and the types of equipment that the wood is burned in. Therefore, Maine was unable to generate its own emission estimates for this significant source category. For Maine's preliminary 2002 criteria pollutant emission estimates from residential wood heat, Maine used the calculations performed by MANE-VU. MANE-VU conducted a survey of residences in the MANE-VU region[17] to determine how much wood was burned to heat residential homes in 2002. MANE-VU contracted E. H. Pechan & Associates to conduct the survey and calculations. Its results are included in a series of technical memorandum and a final report[18].

Pechan obtained valid survey results for 1,904 households across the region. In the survey, Pechan asked about the type of equipment used, the type of wood burned, the season the wood was burned, and the amount of wood burned. The survey locations were based on population-weighting and Heating Degree Days. In Maine, 184 households completed valid surveys. This was about 9.7% of the total surveyed population.

However, due to MANE-VU's small sample size, statistically valid results were only available for the broad categories of indoor and outdoor heating equipment. That is, the survey was not robust enough to determine what percentage of the indoor heating was from fireplaces and what percentage was from woodstoves. The advantage of the MANE-VU survey, however, is that it included general, outdoor equipment use.

Using the information from the survey, Pechan then calculated emission results based on the number of households in the 2000 Census, a wood density of 1.8 tons / cord[19] and the following activity variables and emission factors.

"[Emission estimates are based on] an emissions model (instead of a wood consumption model) at the household level. In this approach, [pollutant] emission estimates were developed for each survey response based on the reported equipment type and annual consumption estimate. For respondents that reported more than one type of device, a single emission estimate was developed for that household based on each equipment type and consumption estimate. These data were then analyzed using several statistical techniques, and an emissions model was developed at the census tract level. The details of this analysis are provided in Appendix C [of TM#5].

"The data in Table 1 [referenced below as Table 5.5.5.4-A] correspond to wood consumption in indoor wood-burning equipment. Table 1 below shows the results of the alternative approach based on a general linear model (see Appendix C [of TM #5] for details). The mean values shown in this table were selected for use in the emissions model. The first column of the table (parameter) shows the cells of the

[17] The members of MANE-VU include Connecticut, Delaware, The District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, The Penobscot Indian Nation, Rhode Island, the St. Regis Mohawk Tribe, and Vermont.

[18] Roe, Stephen M, Holly c. Lindquist, Final Report: MANE_VU Residential Wood Combustion Emission Inventory (EH Pechan & Associates, Inc., PO Box 1345, El Dorado, CA 95623, for Mid-Atlantic Regional Air Management Association, 711 W. 40th Street, Suite 318, Baltimore, MD 21211-2109) June 22, 2004

Technical Memo #1 (TM#6) – Mane-VU Residential Wood Combustion EI Project: Sample Frame Development

TM #2 – MANE-VU Residential Wood Combustion EI Project: Format for Activity Data in the Wood Consumption Model

TM #3 -MANE-VU Residential Wood Combustion EI Project: Pilot Survey and Final Survey Instrument

TM #4 – Results of MANE-VU Residential Wood Combustion Survey

TM #5 - MANE-VU Residential Wood Combustion Survey Data Analysis and Emission Inventory Inputs, February 27, 2004

TM #6 – MANE-VU Residential Wood Combustion Emission Inventory, April 30, 2004

These are all available on MARAMA's website at: http://www.marama.org/visibility/ResWoodCombustion/.

[19] The factor of 1.8 is based on the weighted density of wood obtained from the survey results. Most respondents burned oak, hickory, or other hard woods.

sampling frame to which each mean value was assigned. More background on the sample frame can be found in Section II [of TM #5]. The values shown in Table 1 are for $PM_{2.5}$ emissions. The same general linear model approach was used to develop similar mean values for the remaining CAP and [HAP] species. The mean values for the remaining species [are documented in the final report for this project].

Table 5.5.5.4-A. $PM_{2.5}$ RWC Emission Model Results (lb $PM_{2.5}$/household-yr)

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval		Mean	Std. Deviation	n
					Lower Bound	Upper Bound			
Intercept (SFH, URBAN, All HDD Zones)	1.86	6.37	0.29	0.77	-10.64	14.36	1.86	7.83	209
Other, RNF/S/U, All HDD Zones	0.05	7.41	0.01	0.99	-14.48	14.58	1.91	17.09	599
Other, RF, All HDD Zones	4.12	9.30	0.44	0.66	-14.12	22.36	5.98	32.87	185
Single, S, Low HDD Zone	16.28	12.34	1.32	0.19	-7.93	40.48	18.14	57.56	76
Single, RNF, Low HDD Zone	17.59	10.64	1.65	0.10	-3.27	38.45	19.45	53.97	117
Single, RF, Low HDD Zone	44.81	9.86	4.55	0.00	25.48	64.15	46.68	107.36	150
Single, S, Med HDD Zone	37.25	12.86	2.90	0.00	12.02	62.47	39.11	116.62	68
Single, RNF, Med HDD Zone	22.67	11.53	1.97	0.05	0.07	45.28	24.54	77.56	92
Single, RF, Med HDD Zone	52.82	11.80	4.48	0.00	29.67	75.97	54.68	163.52	86
Single, S, High HDD Zone	18.84	13.41	1.40	0.16	-7.46	45.13	20.70	62.23	61
Single, RNF, High HDD Zone	69.97	11.75	5.95	0.00	46.92	93.03	71.84	161.50	87
Single, RF, High HDD Zone	80.94	9.58	8.45	0.00	62.16	99.73	82.81	206.88	166
Totals							**23.30**	**95.82**	**1896**

"The total number of responses, n, used to construct the model is slightly lower than the total 1904 responses gathered due to the exclusion of several outliers. More details on data reduction and analysis methods are provided under Sections II and III [of TM#5]. To develop the 2002 emission inventory for this project, Pechan [multiplied] the 2000 census tract data on housing units [below] by the mean value of the emission model for each pollutant. The emission inventory developed from the emission model variables [is] documented in Technical Memorandum #6 [as corrected by the final report].

Table 5.5.5.4-B is the sample frame for this study.

Table 5.5.5.4-B: Sample Frame Used for The MANE_VU Study (from Table 1. of the final Study)

Geographic Zone	Urban		Suburban		Rural-Forested		Rural Non-Forested	
Single-Family	Other	Single-Family	Other	Single-Family	Other	Single-Family	Other	
High HDD (=7,000)	1,178,820	1,204,400	1,180,227	712,126	1,731,503	551,816	148,831	39,644
Medium HDD (5,500 – 6,500)	2,182,715	2,352,660	1,164,057	403,774	570,276	136,037	102,585	23,948
Low HDD (=5000)	3,164,407	6,354,442	767,322	380,050	230,929	47,609	239,095	58,623

“For the indoor equipment, Table 1 [below, referenced as Table 5.5.5.4-C] provides the inputs to the emissions model. In this table, each pollutant has a separate set of emission factors in units of pounds per household per year (lb/household-yr). The mean value in Table 1 is the emission factor assigned to each geographic category. Indoor equipment [HAP] emission factors are provided in Appendix A [of TM #6] [and in Appendix F: HAP Emission Factors for Indoor Residential Wood-Fired Heating Equipment of this report]. The 95% confidence interval is also shown with the emission factors in Table 1 [referenced below as Table 5.5.5.4-C] and Appendix A. Note that, in reality, the lower bound can not be less than zero (therefore, the lower bound for negative values should be interpreted as zero).

Table 5.5.5.4-C Indoor Equipment Emission Factors (lb/household-yr)

Pollutant	Category	Mean	95% Confidence Interval		Std. Deviation	N
			Lower Bound	Upper Bound		
$PM_{2.5}$	Intercept (SFH,URBAN, All HDD Zones)	1.863	-10.635	14.362	7.830	209
	Other, RNF/S/U, All HDD Zones	1.912	-14.480	14.577	17.090	595
	Other, RF, All HDD Zones	5.980	-14.123	22.357	32.871	185
	Single, S, Low HDD Zone	18.140	-7.926	40.480	57.556	76
	Single, RNF, Low HDD Zone	19.453	-3.273	38.452	53.975	117
	Single, RF, Low HDD Zone	46.677	25.478	64.149	107.357	150
	Single, S, Med HDD Zone	39.112	12.023	62.475	116.623	68
	Single, RNF, Med HDD Zone	24.536	0.066	45.280	77.561	92
	Single, RF, Med HDD Zone	54.684	29.673	75.969	163.524	86
	Single, S, High HDD Zone	20.699	-7.459	45.131	62.227	61
	Single, RNF, High HDD Zone	71.836	46.919	93.027	161.500	87
	Single, RF, High HDD Zone	82.805	62.157	99.727	206.879	166
		23.344	.	.	95.820	1892
PM_{10}	Intercept (SFH,URBAN, All HDD Zones)	1.863	-10.635	14.362	7.830	209
	Other, RNF/S/U, All HDD Zones	1.912	-14.480	14.577	17.090	595
	Other, RF, All HDD Zones	5.980	-14.123	22.357	32.871	185
	Single, S, Low HDD Zone	18.140	-7.926	40.480	57.556	76
	Single, RNF, Low HDD Zone	19.453	-3.273	38.452	53.975	117
	Single, RF, Low HDD Zone	46.677	25.478	64.149	107.357	150
	Single, S, Med HDD Zone	39.112	12.023	62.475	116.623	68
	Single, RNF, Med HDD Zone	24.536	0.066	45.280	77.561	92

Table 5.5.5.4-C Indoor Equipment Emission Factors (lb/household-yr)

Pollutant	Category	Mean	95% Confidence Interval		Std. Deviation	N
			Lower Bound	Upper Bound		
	Single, RF, Med HDD Zone	54.684	29.673	75.969	163.524	86
	Single, S, High HDD Zone	20.699	-7.459	45.131	62.227	61
	Single, RNF, High HDD Zone	71.836	46.919	93.027	161.500	87
	Single, RF, High HDD Zone	82.805	62.157	99.727	206.879	166
		23.344	.	.	95.820	1892
NO_x	Intercept (SFH,URBAN, All HDD Zones)	0.152	-1.073	1.376	0.639	209
	Other, RNF/S/U, All HDD Zones	0.276	-1.299	1.549	3.356	595
	Other, RF, All HDD Zones	0.509	-1.430	2.145	2.712	185
	Single, S, Low HDD Zone	1.572	-0.951	3.792	4.971	76
	Single, RNF, Low HDD Zone	2.273	0.077	4.166	7.792	117
	Single, RF, Low HDD Zone	4.038	1.992	5.781	9.087	150
	Single, S, Med HDD Zone	3.511	0.888	5.832	9.981	68
	Single, RNF, Med HDD Zone	2.864	0.497	4.928	8.237	92
	Single, RF, Med HDD Zone	5.356	2.936	7.473	15.127	86
	Single, S, High HDD Zone	2.073	-0.655	4.499	6.075	61
	Single, RNF, High HDD Zone	6.451	4.041	8.559	14.446	87
	Single, RF, High HDD Zone	8.520	6.528	10.210	20.809	166
		2.297	.	.	9.386	1892
CO	Intercept (SFH,URBAN, All HDD Zones)	13.761	-86.259	113.780	57.723	209
	Other, RNF/S/U, All HDD Zones	14.187	-115.839	116.692	126.553	595
	Other, RF, All HDD Zones	44.499	-115.225	176.702	243.186	185
	Single, S, Low HDD Zone	134.250	-73.196	314.176	428.922	76
	Single, RNF, Low HDD Zone	145.743	-34.972	298.937	402.824	117
	Single, RF, Low HDD Zone	352.646	184.152	493.619	806.336	150
	Single, S, Med HDD Zone	290.967	75.338	479.074	867.362	68
	Single, RNF, Med HDD Zone	182.919	-11.756	350.072	574.028	92
	Single, RF, Med HDD Zone	426.818	227.814	598.302	1343.505	86

Table 5.5.5.4-C Indoor Equipment Emission Factors (lb/household-yr)

Pollutant	Category	Mean	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Std. Deviation	N
	Single, S, High HDD Zone	162.455	-61.732	359.120	486.077	61
	Single, RNF, High HDD Zone	544.872	346.623	715.599	1222.675	87
	Single, RF, High HDD Zone	664.008	499.918	800.577	1731.650	166
		180.000	.	.	765.732	1892
VOC	Intercept (SFH,URBAN, All HDD Zones)	10.994	-60.627	82.616	49.380	209
	Other, RNF/S/U, All HDD Zones	9.777	-84.473	82.038	89.833	595
	Other, RF, All HDD Zones	28.299	-87.217	121.826	173.526	185
	Single, S, Low HDD Zone	86.996	-62.693	214.696	247.850	76
	Single, RNF, Low HDD Zone	78.111	-52.436	186.669	240.004	117
	Single, RF, Low HDD Zone	198.826	77.030	298.633	498.159	150
	Single, S, Med HDD Zone	185.070	29.523	318.629	546.119	68
	Single, RNF, Med HDD Zone	109.395	-31.148	227.949	399.030	92
	Single, RF, Med HDD Zone	242.202	98.558	363.857	969.969	86
	Single, S, High HDD Zone	75.764	-85.912	215.451	292.378	61
	Single, RNF, High HDD Zone	254.039	110.937	375.153	668.171	87
	Single, RF, High HDD Zone	410.396	291.754	507.049	1363.884	166
		104.256	.	.	540.915	1892
SO_2	Intercept (SFH,URBAN, All HDD Zones)	0.024	-0.148	0.197	0.106	209
	Other, RNF/S/U, All HDD Zones	0.027	-0.198	0.203	0.227	595
	Other, RF, All HDD Zones	0.080	-0.196	0.308	0.421	185
	Single, S, Low HDD Zone	0.226	-0.133	0.536	0.722	76
	Single, RNF, Low HDD Zone	0.280	-0.033	0.544	0.727	117
	Single, RF, Low HDD Zone	0.616	0.324	0.859	1.355	150
	Single, S, Med HDD Zone	0.526	0.153	0.850	1.547	68
	Single, RNF, Med HDD Zone	0.340	0.004	0.628	0.970	92
	Single, RF, Med HDD Zone	0.790	0.446	1.086	2.254	86
	Single, S, High HDD Zone	0.356	-0.032	0.694	1.043	61

Table 5.5.5.4-C Indoor Equipment Emission Factors (lb/household-yr)

Pollutant	Category	Mean	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound	Std. Deviation	N
	Single, RNF, High HDD Zone	0.992	0.649	1.286	2.228	87
	Single, RF, High HDD Zone	1.211	0.927	1.446	2.948	166
		0.329	.	.	1.327	1892
NH_3	Intercept (SFH,URBAN, All HDD Zones)	0.098	-0.622	0.819	0.412	209
	Other, RNF/S/U, All HDD Zones	0.102	-0.834	0.841	0.915	595
	Other, RF, All HDD Zones	0.321	-0.829	1.274	1.752	185
	Single, S, Low HDD Zone	0.969	-0.525	2.266	3.122	76
	Single, RNF, Low HDD Zone	1.056	-0.245	2.160	2.929	117
	Single, RF, Low HDD Zone	2.553	1.340	3.569	5.841	150
	Single, S, Med HDD Zone	2.097	0.544	3.453	6.262	68
	Single, RNF, Med HDD Zone	1.322	-0.080	2.527	4.146	92
	Single, RF, Med HDD Zone	3.086	1.653	4.322	9.670	86
	Single, S, High HDD Zone	1.175	-0.440	2.593	3.512	61
	Single, RNF, High HDD Zone	3.960	2.533	5.191	8.886	87
	Single, RF, High HDD Zone	4.791	3.609	5.775	12.423	166
		1.301	.	.	5.518	1892

For estimating outdoor wood-burning equipment, Pechan used the variables documented in TM#5. These values include the user fraction (UF) and annual consumption (AC; in units of cords/year)[described in Table 5.5.5.4-D, below]:

From TM#5, Table 5.5.5.4-D. Activity Variables for Outdoor Equipment

Geographic Zone	Rural-Forested		Rural-Non-Forested		Suburban		Urban	
	Single-Family	Other	Single-Family	Other	Single-Family	Other	Single-Family	Other
High HDD	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	3 UF= 0.037 AC= 0.250	2 UF= 0.024 AC= 0.330
Low HDD	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	3 UF= 0.037 AC= 0.250	2 UF= 0.024 AC= 0.330	3 UF= 0.037 AC= 0.250	2 UF= 0.024 AC= 0.330
Med HDD	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	1 UF= 0.085 AC= 0.250	2 UF= 0.024 AC= 0.330	3 UF= 0.037 AC= 0.250	2 UF= 0.024 AC= 0.330	3 UF= 0.037 AC= 0.250	2 UF= 0.024 AC= 0.330

Pechan then applied emission factors for fireplaces (see Appendix F: HAP Emission Factors for Indoor Residential Wood-Fired Heating Equipment) to estimate census tract-level emissions.

Shortcomings and Areas for Improvement

This is an important emission category, and substantial uncertainty still exists with these estimation techniques. To obtain better emission estimates, Maine DEP should review the MANE-VU approach in greater detail, other guidance on conducting surveys[20], consider conducting a survey, and coordinate this information with census data and the EPA emission estimation approach (included in Appendix G: EPA's methodology for calculating HAPs from Residential Heating Using Wood (Fireplaces, Inserts, and Woodstoves), (SCCs: 2104008001, 2104008002, 2104008003, 2104008004, 2104008010, 2104008030, and 2104008050).

[20] E.g. MARAMA's Emissions Inventory Improvement Program (EIIP) Residential Wood Combustion Coordination Project, at http://www.marama.org/rtc/ResWoodCombustion/index.html

5.6 FUEL DISTRIBUTION

5.6.1 Aviation Gasoline Distribution: Stage I

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Maine accepts the methodology approached for aviation gasoline distribution: Stage I (SCC: 2501080050) as presented in the 2002 NEI. Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 2002 Methodology

The following descriptions of methodology are quoted from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Aviation gasoline (also called "AvGas") is the only aviation fuel that contains tetraethyl lead (TEL) as a knock-out component for small reciprocating, piston-engine crafts in civil aviation.(1) Commercial and military aviation rarely use this fuel. AvGas is shipped to airports and is filled into bulk terminals, and then into tanker trucks. These processes fall under the definition of stage I, displacement vapors during the transfer of gasoline from tank trucks to storage tanks, and vice versa. These processes are subject to EPA's maximum available control technology (MACT) standards for gasoline distribution.(2)

The amount of AvGas consumed was obtained from the Petroleum Supply Annual(3) for designated Petroleum Administration Districts, or PADs. A nationwide total of 6,682,000 barrels of AvGas were consumed in 2002 (3) (Table 5.6.1-A). This information was used to calculate national-level emissions estimates for one criteria pollutant and ten hazardous air pollutants (HAPs). Assumptions for bulk plant processes are summarized in Table 5.6.1-B. Emission factors were provided by ESD and EFIG publications (1,4,5,6) (Tables 5.6.1-C and 5.6.1-D). The national-level emissions estimates were first allocated based on consumption reported for each PAD, and then allocated to the counties within the PADs based on 2002 Landing-Take Off (LTO) data for General aviation flights.(7) Appendix B contains this data in database format. General aviation flights were used in this allocation because they are the primary consumers of AvGas.

There are five PADs across the United States (8)

- PAD 1 comprises seventeen states plus the District of Columbia along the Atlantic Coast;
- PAD 2 comprises fifteen states in the Midwest;
- PAD 3 comprises six states in South Central U.S.;
- PAD 4 comprises five states in the Rocky Mountains; and
- PAD 5 comprises seven states along the West Coast.

Table 5.6.1-A: Summary of AvGas Consumed and LTOs by PAD in 2002

PAD	AvGas Consumed (barrels)	LTOs
1	1,019,000	204,000
2	2,391,000	186,368
3	1,757,000	138,401
4	399,000	20,625

PAD	AvGas Consumed (barrels)	LTOs
5	1,116,000	184,271
	6,682,000	733,665

Table 5.6.1-B: Assumptions Used For Bulk Terminals Using AvGas

Parameter	Data	Reference
Number of Bulk Plant Equivalents (U.S.)	2,442 plants	
Number of valves per bulk plant	50 valves/plant	
Number of pumps per bulk plant	2 pumps/plant	
Number of seals per bulk plant	4 seals/pump	
Number of days per year used	300 days	1

Table 5.6.1-C: VOC Emission Factors and National-Level Emissions

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Emissions (tpy)	Factor Reference
VOC	Aviation Gas Unloading/ Tank Filling - tank fill	1081	mg/L AvGas	31,397.43	1
	Aviation Gas Unloading/ Tank Filling - Storage tank working	432			
	Aviation Gas Tank Truck Filling – Composite	1235			
	Aviation Gas Storage Tank - Breathing losses	203			
	Aviation Gas - Fugitive from valves	0.26	kg/valve/day		
	Aviation Gas - Fugitive from pumps	2.7	kg/seal/day		

Table 5.6.1-D: HAP Emission Factors and National-Level Emissions

Pollutant	Emission Source	Emission Factor	Emission Factor Units	Emissions (tpy)	Factor Reference
Ethylene Dichloride	All processes	2.167 E-6	lb/gal AvGas	0.30	4
Tetraethyl Lead (TEL)	All processes	9.78 E-6	kg/kg VOC	0.31	1
2,2,4-Trimethylpentane	All processes	0.80		251.18	5
Benzene	All processes	0.90		282.58	
Cumene	All processes	0.01		3.14	6
Ethylbenzene	All processes	0.10		31.40	
Hexane	All processes	1.60		502.36	
Naphthalene	All processes	0.05		15.70	
Toluene	All processes	1.30	lb/100 lb VOC	408.17	
Xylene	All processes	0.50		156.99	5

National-Level Calculations

Amount of AvGas consumed in 2002 (barrels) = 6,682,000

Conversion: *1 barrel = 42 gallons*
1 gallon = 3.78 liters
1 kg = 2.205 lb
1 kg = 1,000,000 mg
1 ton = 2000 lb

Step 1: Convert AvGas consumption into gallons and liters using conversion factors.

Amount of AvGas consumed in 2002 (gallons) = 6,682,000 barrels * 42 gallons/barrel
Amount of AvGas consumed in 2002 (gallons) = 280,644,000

Amount of AvGas consumed in 2002 (liters) = 280,644,000 gallons * 3.78 liters/gal
Amount of AvGas consumed in 2002 (liters) = 1,060,834,320

***Step 2: Use the liters of AvGas consumed and apply the non-fugitive VOC emission factors in Table 5.6.1-C to calculate non-fugitive VOC estimates*. VOC emission factors for the four non-fugitive processes are listed in Table 5.6.1-C.**

Unloading/Tank Filling: tank fill VOC emissions = 1081 mg/L * 1,060,834,320 L * 1.1025E-9 ton/mg
Unloading/Tank Filling: tank fill VOC emissions = 1,264.30 tpy

Unloading/Tank Filling: Storage tank VOC emissions = (432 mg/L) * 1,060,834,320 L * 1.1025E-9 ton/mg
Unloading/Tank Filling: Storage tank VOC emissions = 505.25 tpy

Tank Truck Filling - Composite VOC Emissions = (1235 mg/L) * 1,060,834,320 L * 1.1025E-9 ton/mg
Tank Truck Filling - Composite VOC Emissions = 1,444.42 tpy

Storage Tank - Breathing losses VOC Emissions = (203 mg/L) * 1,060,834,320 L * 1.1025E-9 ton/mg
Storage Tank - Breathing losses VOC Emissions = 237.42 tpy

Total non-fugitive VOC emissions = 1,264.30 tpy + 505.25 tpy + 1,444.42 tpy + 237.42 tpy = 3,451.39 tpy

Step 3: Use the assumptions in Table 5.6.1-B and the fugitive VOC emission factors in Table 5.6.1-C to generate fugitive VOC emissions.

AvGas - Fugitive from valves VOC Emissions = (# Bulk Plant Equivalents)*(#valves/plant)*EF*days
AvGas - Fugitive from valves VOC Emissions = (2442 plants) * (50 valves/plant) * (0.26 kg/valve/day)* 300 days * 1.1025E-3 ton/kg
AvGas - Fugitive from valves VOC Emissions = 10,499.99 tpy

AvGas - Fugitive from pumps VOC Emissions = (# Bulk Plant Equivalents)*(#pumps/plant)*(#seals/pump) * EF * days
AvGas - Fugitive from pumps VOC Emissions = (2442 plants) * (2 pumps/plant) * (4 seals/pump) *
(2.7 kg/seal/day)* 300 days * 1.1025E-3 ton/kg

AvGas - Fugitive from pumps VOC Emissions = 17,446.14 tpy

Total fugitive VOC emissions = 10,499.99 tpy + 17,446.14 tpy
Total fugitive VOC emissions = 27,946.04 tpy

Step 4: Sum the fugitive and non-fugitive VOC emissions together for total VOC emissions.

Total VOC emissions = 3,451.39 tpy + 27,946.04 tpy = 31,397.43 tpy

Step 5: Apply the speciation emission factors in Table 5.6.1-D for tetraethyl lead, 2,2,4-trimethylpentane, benzene, cumene, ethylbenzene, hexane, naphthalene, toluene, and xylene to calculate HAP emissions.

Tetraethyl Lead emissions = 31,397.43 tpy VOC * 0.000978 % = 0.31 tpy
2,2,4-Trimethylpentane emissions = 31,397.43 tpy VOC * 0.8 % = 251.18 tpy
Benzene emissions = 31,397.43 tpy VOC * 0.9 % = 282.58 tpy
Cumene emissions = 31,397.43 tpy VOC * 0.01 % = 3.14 tpy
Ethylbenzene emissions = 31,397.43 tpy VOC * 0.10 % = 31.40 tpy
Hexane emissions = 31,397.43 tpy VOC * 1.60 % = 502.36 tpy
Naphthalene emissions = 31,397.43 tpy VOC * 0.05 % = 15.70 tpy
Toluene emissions = 31,397.43 tpy VOC * 1.30 % = 408.17 tpy
Xylene emissions = 31,397.43 tpy VOC * 0.5 % = 156.99 tpy

Step 6: Use the ethylene dichloride emission factor in Table 5.6.1-D to calculate ethylene dichloride emissions.

Ethylene dichloride emissions = 280,644,000 gal * 2.167E-6 LB/gal * ton/2000 LB = 0.30 tpy

Example Calculations for Wake County, NC

Wake County VOC emissions = (National VOC emissions) * (PAD 1 consumption/Total consumption) * (Wake County LTOs/PAD 1 LTOs)

Wake County VOC emissions = (31,397.43 tpy) * (1,019,000 bbl/6,682,000 bbl) * (4,387 LTOs/204,000 LTOs)

Wake County VOC emissions = **102.97** tpy

Wake County Benzene Emissions = (Wake County VOC emissions)*(Benzene Emission Factor)

Wake County Benzene Emissions = (102.97 tpy VOC) * (0.90 lb benzene/100 lb VOC)* (2000 lb VOC/2000 lb benzene)

Wake County Benzene Emissions = **0.93** tpy

Shortcomings and Recommendations for Improvements

Historically, the Maine inventory has based emissions on total through-put of aviation fuel for the state and not broken it down into Stage I and Stage II emissions. Maine will wait to see EPA calculations to determine if there is a significant difference between methodologies and whether we will submit new calculations at a later date.

References

1. TRC Environmental Corporation. *Estimation of Alkylated Lead Emissions, Final Report*. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. RTP, NC 1993.

2. U.S. Environmental Protection Agency. National Emission Standards for Source Categories: Gasoline Distribution (Stage I). 40 CFR Part 63. Office of Air Quality Planning and Standards. RTP, NC. February 28, 1997. Pages 9087-9093.

3. Energy Information Administration. U.S. Department of Energy. *Petroleum Annual Supply, 2002*. Tables 2, 4, 6, 8, 10, and 12. Department Of Energy. Washington, D.C. August 2003. (Internet address: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html) "

5.6.2 Aviation Gasoline Distribution: Stage II

Maine DEP contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

Maine accepts the methodology approached for aviation gasoline distribution: Stage II (SCC: 2501080100) as presented in EPA's preliminary 2002 NEI calculations. Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

This methodology is taken from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

EPA 2002 Methodology

AvGas is the only aviation fuel that contains TEL as a knock-out component for small reciprocating, piston-engine crafts in civil aviation.(1) Commercial and military aviation rarely use this fuel. AvGas is shipped to airports and is filled into bulk terminals, and then into tanker trucks. These transfer processes fall under the definition of Stage I, and are subject to MACT standards for gasoline distribution.(2) Stage II, discussed here, involves the transfer of fuel from the tanker trucks into general aviation aircraft.

The amount of AvGas consumed was retrieved from the Petroleum Supply Annual for designated PADs. A nationwide total of 6,682,000 barrels of AvGas were consumed in 2002(3) (Table 5.6.2-A). This information was used to calculate national-level emissions estimates for one criteria pollutant and ten HAPs. Emission factors were obtained from ESD and the EFIG publications (1,4,5,6) (Table 5.6.2-B). The national-level emissions estimates were first allocated based on consumption reported for each PAD, and then allocated to the counties within the PADs based on 2002 LTO data for General aviation flights.(7) General aviation flights were used in this allocation because they are the primary consumers of AvGas.

There are five PADs across the United States (8) (Table 5.6.2-A):

PAD 1 comprises seventeen states plus the District of Columbia along the Atlantic Coast;
PAD 2 comprises fifteen states in the Midwest;
PAD 3 comprises six states in South Central U.S.;

PAD 4 comprises five states in the Rocky Mountains; and
PAD 5 comprises seven states along the West Coast.

Table 5.6.2-A: Summary of AvGas Consumed and LTOs by PAD in 2002

PAD	AvGas Consumed (barrels)	LTOs
1	1,019,000	204,000
2	2,391,000	186,368
3	1,757,000	138,401
4	399,000	20,625
5	1,116,000	184,271
	6,682,000	733,665

Table 5.6.2-B: Emission Factors and National-Level Emissions

Pollutant	Emission Factor	Emission Factor Units	Emissions (tpy)	Factor Reference
VOC	1.36 E-2	lb/gal AvGas	1,908.38	1
2,2,4-Trimethylpentane	0.80	lb/100 lb VOC	15.27	5“
Benzene	0.90	“	17.18	‘
Cumene	0.01	“	0.19	6
Ethylbenzene	0.10	“	1.91	5“
Hexane	1.60	“	30.53	“
Naphthalene	0.05	“	0.95	“
Toluene	1.30	“	24.81	“
Xylene	0.50	“	9.54	‘
Ethylene Dichloride	1.883 E-6	lb/gal AvGas	0.26	4
Tetraethyl Lead (TEL)	1.59 E-2	mg/L AvGas	0.019	1

National-Level Calculations

Amount of AvGas consumed in 2002 (barrels) = 6,682,000

Conversion: 1 barrel = 42 gallons
1 gallon = 3.78 liters
1 kg = 2.205 lb
1 kg = 1,000,000 mg
1 ton = 2000 lb

Step 1: Convert AVGas consumption into gallons and liters using conversion factors.

Amount of AvGas consumed in 2002 (gallons) = 6,682,000 barrels * 42 gallons/barrel
Amount of AvGas consumed in 2002 (gallons) = 280,644,000

Amount of AvGas consumed in 2002 (liters) = 280,644,000 gallons * 3.78 liters/gal
Amount of AvGas consumed in 2002 (liters) = 1,060,834,320

Step 2: Use the gallons of AvGas consumed and apply the refueling VOC emission factors to first calculate refueling VOC estimates.

AvGas Refueling VOC emissions = (1.36 E-2 LB/gal AvGas) * 280,644,000 gallons * 1 ton/2000 LB
AvGas Refueling VOC emissions = 1,908.38 tpy

Step 3: Apply the HAP speciation emission factors in Table 5.6.2-B for 2,2,4-trimethylpentane, benzene, cumene, ethylbenzene, hexane, naphthalene, toluene, and xylene to calculate HAP emissions. **The VOC estimate is then speciated to yield the HAP estimate.**

2,2,4-Trimethylpentane emissions = 1,908.38 tpy VOC * 0.8 % = 15.27 tpy
Benzene emissions = 1,908.38 tpy VOC * 0.9 % = 17.18 tpy
Cumene emissions = 1,908.38 tpy VOC * 0.01 % = 0.19 tpy
Ethylbenzene emissions = 1,908.38 tpy VOC * 0.10 % = 1.91 tpy
Hexane emissions = 1,908.38 tpy VOC * 1.60 % = 30.53 tpy
Naphthalene emissions = 1,908.38 tpy VOC * 0.05 % = 0.95 tpy
Toluene emissions = 1,908.38 tpy VOC * 1.30 % = 24.81 tpy
Xylene emissions = 1,908.38 tpy VOC * 0.5 % = 9.54 tpy

Step 4: Use the ethylene dichloride and tetraethyl lead emission factors in Table 5.6.2-B to calculate ethylene dichloride and tetraethyl lead emissions.

Ethylene dichloride emissions = 280,644,000 gal * 1.883 E-6 LB/gal * ton/2000 LB = 0.26 tpy
Tetraethyl Lead emissions = 1,060,834,320 L * 1.59 E-2 mg/L * 1.1025E-9 ton/mg = 0.019 tpy

<u>Example Calculations for Wake County, NC</u>

Wake County VOC emissions = (National VOC emissions) * (PAD 1 consumption/Total consumption) * (Wake County LTOs/PAD 1 LTOs)

Wake County VOC emissions = (1,908.38 tpy) * (1,019,000 bbl/6,682,000 bbl) * (4,387 LTOs/204,000 LTOs)

Wake County VOC emissions = **6.26** tpy

Wake County Benzene Emissions = (Wake County VOC emissions)*(Benzene Emission Factor)

Wake County Benzene Emissions = (6.26 tpy VOC) * (0.90 lb benzene/100 lb VOC)* (2000 lb VOC/2000 lb benzene)

Wake County Benzene Emissions = **0.056** tpy

<u>Shortcomings and Areas for Improvements</u>

Historically, the Maine inventory has based emissions on total through-put of aviation fuel for the state and not broken it down into Stage I and Stage II emissions. Maine will wait to see EPA calculations to determine if there is a significant difference between methodologies and whether we will submit new calculations at a later date.

References

1. TRC Environmental Corporation. *Estimation of Alkylated Lead Emissions, Final Report*. Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. RTP, NC 1993.

2. U.S. Environmental Protection Agency. National Emission Standards for Source Categories: Gasoline Distribution (Stage I). 40 CFR Part 63. Office of Air Quality Planning and Standards. RTP, NC. February 28, 1997. Pages 9087-9093.

3. Energy Information Administration. U.S. Department of Energy. *Petroleum Annual Supply, 2002*. Tables 2, 4, 6, 8, 10, and 12. Department Of Energy. Washington, D.C. August 2003. (Internet address: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html)

4. U.S. Environmental Protection Agency. *Locating and Estimating Air Emissions from Sources of Ethylene Dichloride*. EPA-450/4-84-007d. RTP, NC. March 1984.

5. Memorandum from Greg LaFlam and Tracy Johnson (PES) to Stephen Shedd (EPA/OAQPS). *Speciated Hazardous Air Pollutants - Baseline Emissions and Emissions Reductions Under the Gasoline Distribution NESHAP*. August 9, 1996.

6. Personal Communication via e-mail from Stephen Shedd (EPA/OAQPS) to Laurel Driver (EPA/OAQPS). E-mail dated May 29, 2002.

7. Federal Aviation Administration (FAA). Air Traffic Activity Data System (ATADS) for General Aviation, Year 2002. FAA. 2003.

8. Energy Information Administration. U.S. Department of Energy. *Petroleum Annual supply, 2002*. Appendix A. Department Of Energy. Washington, D.C. August 2003. (Internet address: http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_supply_annual/psa_volume1/psa_volume1.html)

5.6.3 Gasoline Distribution, Stage I: Bulk terminals, Plants and Pipelines

The Stage I Bulk terminals, plants and pipelines (SCC: 2501050120) report emissions as part of Maine's Point Source Inventory. However, Maine does not have any facilities that report under this specific SCC, 2501050120. However, facilities do report under the following list of SCCs:

Facilities	SCC	Description
4*	40400199	Petroleum Liquids Storage (non-Refinery) – see comments** on report
1	40400206	Gasoline RVP 7: Working Loss (67000 Bbl. Capacity) - Fixed Roof Tank
7 *	40400250	Loading Racks
1	40400251	Valves, Flanges, and Pumps
2*	40400254	Tank Truck Vapor Losses

Note: * Facilities reporting in multiple SCCs.

5.6.4 Gasoline Distribution, Stage I: Submerged and Vapor Balanced Fill Tanks at Gasoline Stations

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Maine has chosen to update estimates and perform emission calculations for the 2002 NEI for Gasoline Distribution: Stage I, Submerged Fill Tanks (SCC: 2501060051) and Vapor Balanced Fill Tanks (SCC: 2501060053) at gasoline stations.

Methodology

The EPA 1999 NEI[21] combined two categories under this SCC (SCC 40600306 - Balanced submerged fill gasoline tanks, and SCC 40600302 - Submerged fill tanks without controls). For the 2002 NEI, however, these categories were separated out again. VOC emissions were calculated using guidance from AP-42[22] and EIIP.[23] HAP emissions were speciated as a percent of the VOC emissions as provided in the 1999 NEI documentation.[24]

According to Maine DEP, Oil and Hazardous Waste database, 95% of the splash fill tanks have been replaced and use of the remaining 5% is unknown. The Air Bureau is assuming that 95% of these new service station tanks are equipped for vapor balanced fill, and 5% are equipped for submerged fill.

Monthly gasoline sales data was acquired from the US Department of Energy (DOE), Energy Information Administration (EIA).[25] EPA guidance states that gasoline delivery with tank trucks occur six days per week, 312 days per year.[26] Statewide gasoline sales were apportioned to the county level based on Vehicle Miles Traveled (VMT) data for the counties.

Emission Factors

EF for vapor balance tanks = 0.3 lbs. VOC/1000 gal
EF for submerged fill tanks = 7.3 lbs. VOC/1000 gal
EF for uncontrolled tanks = 11.5 lbs. VOC/1000 gal
Control efficiency of vapor balance tanks = (11.5-0.3)/11.5 = 97.4%
Rule Effectiveness = 80%

Pollutant	Emission factor % VOC	EF Reference
Total VOCs	See above	AP-42 Chapter 5, Table5.2-7.
Benzene	0.73%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Naphthalene	0.05%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Hexane	1.52%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Toluene	1.22%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
2,2,4-Trimethylpentane	0.76%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Xylene	0.46%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Ethylbenzene	0.1%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
Cumene	0.01%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.
MTBE	1.34%	1999 NEI File: nonpt99ver3_aug2003.pdf page A-35.

[21] 1999 NEI File: nonpt99ver3_aug2003.pdf page A-35
[22] AP-42 Chapter 5, Table5.2-7
[23] EIIP Chapter 11, Gasoline Marketing, January 31, 2001.
[24] 1999 NEI File: nonpt99ver3_aug2003.pdf page A-35
[25] http://www.eia.doe.gov/emeu/states/oilsales_trans/oilsales_trans_me.html
[26] EIIP Chapter 11, Gasoline Marketing, Table 11,3-5, January 31, 2001.

16 PAH	0.05%	EIIP Vol III Chap. 11, Table 11.3-2.

Sample Calculation for Cumberland County

2002 Daily Statewide Gasoline Throughput 2,182.8-1000 gal

2002 Actual Daily Vehicle Miles Traveled (ADVMT) 40,143,888 miles

2002 Actual Cumberland County ADVMT 8,380,980 miles (20.88%)

2002 Daily vapor balanced throughput for Cumberland County
= (2,182.8-1000 gal) * 20.88% * 0.95
= 432.93-1000 gal

2002 Daily submerged fill throughput for Cumberland County
= (2,182.8-1000 gal) * 20.88% * 0.05
= 22.79-1000 gal

Vapor Balance Tank Emissions

(432.93-1000 gal) * (11.5 lbs. VOC/1000 gal) * (1-(0.974)(0.8)) / 2000 = **0.550 tpd VOC**

0.550 tpd VOC * 312 days/year = **171.49 tpy VOC**

Submerged Fill Tank Emissions

(22.79-1000 gal) * (7.3 lbs. VOC/gal) / 2000 = **0.083 tpd VOC**

0.083 tpd VOC * 312 days/year = **25.95 tpy VOC**

Benzene Calculation for Vapor Balance Tank Emissions

171.49 tpy VOC * 0.73% Benzene = **1.25 tpy Benzene**

5.6.5 Gasoline Distribution, Stage II: Vehicle Refueling

Maine DEP contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

Due to staff limitations, Maine was unable to perform the MOBILE6 runs necessary to calculate Stage II, Vehicle Refueling emissions prior to the June 1, 2004 submission deadline. **Maine has since complete these MOBILE runs and provided Stage II Vehicle Refueling (SCC: 250106010) emission estimates as part of the May 1, 2005 revisions.**

Maine 2002 Methodology

The EIIP Preferred Methodology recommends that the current MOBILE model be run to determine the Stage II refueling emission rate on a mass per volume throughput (grams per gallon) basis, applying Stage II control factors where applicable. MOBILE6.2 produces emission factors expressed as grams per mile, so rather than using gasoline tax records as suggested in the Preferred Methodology, Maine applied these emission factors to county VMT as reported by the Department of Transportation. While VMT may not coincide completely with retail gasoline sales, it is a widely-used and acceptable surrogate.

Maine has three counties with Stage II Programs: Cumberland (005), Sagadahoc (023), and York (031). There is also a Summer Fuel Program (7.8 RVP requirement) for the southern counties of Androscoggin (001), Kennebec (011), Knox (013), and Lincoln (015). In the remaining nine counties, there is neither a Stage II Program nor a Summer Fuel Program. As Stage II emissions vary greatly based on RVP and temperature, seasonal Stage II refueling emission factors were calculated for five different groups of variables, as shown in Table 5.6.5-A.

Table 5.6.5-A: MOBILE6.2 Input Variables for Stage II Refueling Emission Factors

County FIPS	Season	RVP	Min Temperature	Max Temperature	Eval Month	Stage II Program?	Summer Fuel Program?
001, 011, 013, 015	Winter	12.3	22	45	1	No	Yes
	Spring	10.3	29	69	1	No	Yes
	Summer	7.8	55	87	7	No	Yes
	Fall	10.3	32	78	7	No	Yes
003, 007, 009, 017, 019, 021, 025, 027, 029	Winter	13.5	22	45	1	No	No
	Spring	10.8	29	69	1	No	No
	Summer	9	55	87	7	No	No
	Fall	10.8	32	78	7	No	No
005	Winter	12.3	22	45	1	Yes	Yes
	Spring	10.3	29	69	1	Yes	Yes
	Summer	7.8	55	87	7	Yes	Yes
	Fall	10.3	32	78	7	Yes	Yes
023	Winter	12.3	22	45	1	Yes	Yes
	Spring	10.3	29	69	1	Yes	Yes
	Summer	7.8	55	87	7	Yes	Yes
	Fall	10.3	32	78	7	Yes	Yes
031	Winter	12.3	22	45	1	Yes	Yes
	Spring	10.3	29	69	1	Yes	Yes
	Summer	7.8	55	87	7	Yes	Yes
	Fall	10.3	32	78	7	Yes	Yes

The formula for calculating emissions requires you first to calculate the seasonal emissions and then sum the seasonal emissions for total tons per year. For any season, the formula is as follows:

Seasonal VOC Stage II Refueling Emissions (tpy) = County-Annual VMT (E6 miles) * Seasonal VOC Refueling EF (grams/mile) * # days in season/365 days per year * 1,000,000 * 0.000001102 tons/gram

Annual VOC Stage II Refueling Emissions (tpy) = $\sum$ Seasonal Stage II Refueling Emissions (tpy)

The following speciation profile is used to develop HAP estimates for Stage II refueling emissions.

Table 5.6.5-B: HAP Speciation Profile for Stage II Refueling Emissions

Pollutant	Emission Factor (%VOC)	Source
2,2,4-Trimethylpentane	0.8%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Benzene	0.9%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP

		Estimates-Gasoline Distribution Stage II (July 2003)
Cumene	0.01%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Ethyl Benzene	0.1%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Hexane	1.6%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Naphthalene	0.05%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Toluene	1.3%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Xylene	0.5%	1999 NEI Methodology, Appendix A: NEI NONPOINT HAP Estimates-Gasoline Distribution Stage II (July 2003)
Methyl Tert-butyl Ether	2.4%	2002 Maine Fuels Report, Maine DEP (February 2003)

Sample Calculations for Cumberland County

Cumberland County is one of the Maine counties with a Stage II Refueling Program. In the MOBILE6.2 Input file Run section, the following is used to describe the Stage II program:

```
RUN DATA
* Maine run for Cumberland County to determine Stage II refueling emissions
for 2002;
* LDGV/T effectiveness 86 percent X [(LDGV/T Stage II Gas 137,862 + 100,468 +
34,607) / Total Gas 523,284]
* HDGV effectiveness 86 percent X [(HDGV Stage II Gas 22,011) / Total Gas
523,284)
STAGE II REFUELING :
95 3 45. 4.
```

The seasonal emission factors and days per season for Cumberland County are:

Season	VOC EF (grams/mile)	Days Per Season
Winter	0.092	90
Spring	0.089	92
Summer	0.082	92
Fall	0.094	91

Seasonal Stage II Emissions (tpy) =Cumberland County Annual VMT (E6 miles) * Seasonal VOC Refueling EF (grams/mile) * # days in season/365 days per year * 1,000,000 * 0.000001102 tons/gram

Winter: 3,059.057 E6Miles * 0.092 grams/mile * (90/365) * 1000000 * 0.000001102 tons/gram = 76.47 tpy VOC
Spring: 3,059.057 E6Miles * 0.089 grams/mile * (92/365) * 1000000 * 0.000001102 tons/gram = 75.62 tpy VOC
Summer: 3,059.057 E6Miles * 0.082 grams/mile * (92/365) * 1000000 * 0.000001102 tons/gram = 69.68 tpy VOC
Fall: 3,059.057 E6Miles * 0.094 grams/mile * (91/365) * 1000000 * 0.000001102 tons/gram = 79.00 tpy VOC

Annual Emissions = ∑ Seasonal Emissions
= 76.47 + 75.62 + 69.68 + 79.00
= 300.77 tpy VOC in Cumberland County

Benzene Emissions = tpy VOC * 0.9%
= 300.77 tpy VOC * 0.009
= 2.71 tpy Benzene in Cumberland County

References

1. EIIP Document Series, Volume III: *Chapter 11, Gasoline Marketing (Stage I and Stage II)*. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised Final, January 2001. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii11_apr2001.pdf

2. "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants" (Version 3), U.S. Environmental Protection Agency, August 2003.

5.6.6 Natural Gas Transmission and Storage

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

The 1999 NEI indicates that in Maine there were no emissions from this source category (SCC: 31000299). The 1999 NEI data was based on values from the 1998 MACT category 504[27]. For EPA's preliminary 2002 NEI calculations, EPA is rolling the 1999 estimates forward[28]. However, since the 1999 inventory was completed, Maritimes & Northeast Pipeline, LLC, (M&N) has built a natural gas pipeline through Maine from Nova Scotia to the Boston market. The pipeline includes two pumping stations, one in Richmond (County 023), and one in Baileyville (County 001). Maine DEP has reported emissions from the pipeline on June 1, 2004, as part of Maine's Point Source Inventory for the 2002 NEI. Table 5.6.6-A includes the descriptions of emissions from M&N facilities that were included in the point source inventory. The remaining area source emissions for this category in Maine are assumed to be zero for all counties at this time.

Table 5.6.6-A: Natural Gas Transmission and Storage Units in Maine Included in Maine's Point Source Inventory.

NAME	POINTDESC	SEGMT_DESC	SCC	FUEL_PROC	SCC_UNITS
MARITIMES & NORTHEAST PIPELINE LLC	GAS TURBINE #1	NATURAL GAS	20300202	210.73	Million Cubic Feet Burned
MARITIMES & NORTHEAST PIPELINE LLC	AUX GENERATOR	NATURAL GAS	20300202	0.06	Million Cubic Feet Natural Gas Burned
MARITIMES & NORTHEAST PIPELINE LLC	GAS TURBINE #1	NATURAL GAS	20300202	180.81	Million Cubic Feet Natural Gas Burned
MARITIMES & NORTHEAST PIPELINE LLC	AUX GENERATOR	NATURAL GAS	20300202	0.124	Million Cubic Feet Burned
MARITIMES & NORTHEAST PIPELINE LLC	GAS TURBINE #2	NATURAL GAS	20300202	35.59	Million Cubic Feet Natural Gas Burned

[27] Descriptions of methodology in "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version"[27] references the EPA Emissions Standard Division (ESD) source as 1998 base year values (Table 3-1), MACT 504 Category (Table 2-2).
[28] EPA, File: 2002prelimneinonpoint_032004.pdf, pages 2-7, 3-2.

NAME	POINTDESC	SEGMT_DESC	SCC	FUEL_PROC	SCC_UNITS
MARITIMES & NORTHEAST PIPELINE LLC	GAS TURBINE #2	NATURAL GAS	20300202	345.45	Million Cubic Feet Natural Gas Burned
MARITIMES & NORTHEAST PIPELINE LLC	BLOWDOWNS	STATION BLOWDOWNS	31088811	1.19	Million Cubic Feet Material Produced
MARITIMES & NORTHEAST PIPELINE LLC	STATION BLOWDOWNS	STATION BLOWDOWNS	31088811	1.34	Million Cubic Feet Material Produced

Areas for Improvements

EPA has not publicized a methodology for emission estimates for this category in the 1999 NEI documentation, or 2002 preliminary documentation. Maine DEP could gather information from the EPA's Emissions Standards Division to determine if area source losses are significant from pipeline facilities other than the pumping stations.

5.6.7 Petroleum Vessel Loading, Ballasting and Transit Losses

Maine DEP contact: Tammy Gould (207)287-7036 or Tammy.Gould@Maine.gov

Maine is providing its own calculations for air pollutant emissions from petroleum vessel loading, ballasting, and transportation losses (SCCs: 2505020030, 2505020090, 2505020120, 2505020121, 2505020030, 2505020150, 2505020180).

Maine 2002 Methodology

Using data from the U.S. Army Corps of Engineers publication *Waterborne Commerce of the United States*(1) pertaining to the movement of petroleum products throughout state coastal waters, estimates were made for this category source. All evaporative losses were calculated using the EPA "preferred method" given in *EIIP* Volume III: Chapter 12, section 4 (2). Total petroleum product movement was obtained from the foreign and Canadian "inbound" and "outbound;" the domestic ("coastwise") "receipts" and "shipments;" and Internal columns.

Loading losses were calculated by applying emission factors from *EIIP* for ship/ocean vessel and barge loading, to total outbound, shipment, and internal petroleum throughput. The relative percentages of barges versus tankers were extracted from "Trips and Drafts" section of the reference *Waterborne Commerce of the United States*. It should be noted that very little marine loading of petroleum takes place in Maine harbors.

Ballasting and transit losses do indeed occur. Emissions from ballasting are a function of the amount of ballast water used. According to AP-42 guidance(3), 15%-40% of total product transferred is replaced with ballast water. For the 1999 PEI, a 40% ballast rate was used and is used again for 2002 NEI calculations. It should be noted that many ships are equipped with segregated ballast tanks which effectively control VOC losses during ballasting. The relative percentage of ships operating in Maine waters with segregated ballast tanks is unknown; therefore it is assumed that all ships are *not* equipped with segregated tanks. Emission factors from *EIIP* were applied to the adjusted inbound and receipt freight totals to estimate VOC losses from marine ballasting.

As for transit emissions, the estimate is dependent on the length of time the ship was in the inventory area. Since little data exists for this category, it was assumed that the ships/barges were in port for only one day during unloading. Emissions from petroleum distribution are assumed to be uniform year-round and therefore no daily or seasonal adjustments were made.

Evaporative VOC losses (working losses) from marine vessel unloading to bulk storage tanks at terminals are accounted for in the point source inventory.

Table 5.6.7-A contains the crosswalk between SCCs and Commodity Classification Codes in *Waterborne Commerce of the United States.* Table 5.6.7-B contains emissions factors used by petroleum product and activity. Maine is assuming that 100% of emissions are uncontrolled.

Table 5.6.7-A: SCC and Commodity Classification Codes

SCC	SCC Description - *Petroleum and Petroleum Product Transport: Marine Vessel:*	AP-42 Product Type Class	Commodity Classification Code	Commodity Name
2505020030	Crude Oil	Crude	2100	Crude Petroleum
2505020060	Residual Oil	Residual	2340	Residual Fuel Oil
			2430	Asphalt, Tar and Pitch
			2540	Petroleum Coke
2505020090	Distillate Oil	Distillate	2330	Distillate Oil
			2350	Lube Oil & Grease
			2410	Petroleum Jelly and Waxes
2505020120	Gasoline	Gasoline	2640	Liquid Natural Gas
			2211	Gasoline
2505020150	Jet Naphtha	Jet Naphtha	2429	Naphtha & Solvents
			2990	Petroleum Prod., NEC
2505020180	Kerosene	Distillate	2221	Kerosene

Table 5.6.7-B: Uncontrolled VOC Emission Factors for Petroleum Carrying Marine Vessels (EPA, 1996)

Petroleum Liquid	Ship/Ocean Vessel Loading (lbs. VOC/1,000 gal. transferred)	Barge Loading (lbs. VOC/1,000 gal. transferred)	Ballasting (lbs. VOC/1,000 gallons ballasted)	Transit (lbs. VOC per week per 1,000 gal. transported)
Crude Oil	0.61	1	1.1	1.3
Gasoline	1.8	3.4	0.8	2.7
Jet Naphtha/ Other	0.5	1.2	NA	0.7
Distillate Oil/ Kerosene	0.005	0.012	NA	0.005
Residual Oil	4×10^{-5}	9×10^{-5}	NA	3×10^{-5}

Sample Calculation

The formula for calculating total VOC emissions from petroleum vessel loading, ballasting and transit losses for a given petroleum product requires one to add ship loading losses, barge loading losses, ballasting and transit losses. The formula for that calculation is in Table 5.6.7-C.

Table 5.6.7-3: Formula for Calculating VOC Losses from Petroleum Vessel Loading, Ballasting, and Transit Losses

E(voc) =((SL(EF)*SL(%)*SL(P)) + (BL(EF)*BL(%)*BL(P) + (B(EF)*B(est)*B(P)) + ((T(EF)*T(P))/7)/2000		
Where:	E(voc)	is total VOC emissions from petroleum vessel loading, ballasting, and transit for a given petroleum product (tpy)
Ship/Ocean Vessel Loading	SL(EF)	is the Ship Loading Emission Factor for a given petroleum product (expressed as lbs. VOC/1,000 gallons)
	SL(%)	is the percent of vessel traffic attributable to ships
	SL(P)	is the amount of a given petroleum product loaded into ships (expressed in 1,000 gallons)
Barge Loading	BL(EF)	is the Barge Loading Emission Factor for a given petroleum product (expressed as lbs. VOC/1,000 gallons)
	BL(%)	is the percent of vessel traffic attributable to barges
	BL(P)	is the amount of a given petroleum product loaded into barges (expressed in 1,000 gallons)
Ballasting	B(EF)	is the Ballasting Emission Factor for a given petroleum product (expressed as lbs. VOC/1,000 gallons)
	B(est)	is the percent of vessels that use seawater for ballast (40% estimate)
	B(P)	is the amount of a given petroleum product unloaded from vessels that are ballasted (expressed in 1,000 gallons)
Transit	T(EF)	is the Transit Emission Factor for a given petroleum product (expressed in lbs. VOC/week/1,000 gals – divided by 7, assuming one day in port)
	T(P)	is the total amount of a given petroleum product transported by marine vessels (expressed in 1,000 gallons)

Example: VOC losses from marine vessel loading, ballasting and transit Gasoline in Cumberland County

Ship/Ocean Vessel Loading loss:
2,857.1 MGal Gasoline x 58.4% Ship x 1.8 Lbs. VOC/MGal = 3,003.4 Lbs. VOC

Barge Loading loss:
(no gasoline loaded on barges)

*Ballasting Loss:**
810,357.1 MGal Gasoline x 40% x 0.8 Lbs. VOC/MGal = 259,314.3 Lbs. VOC

*Assumes a 40% ballast rate

Transit Loss:
(813,214.3 MGal Gasoline x 2.7 Lbs. VOC/MGal/week) / 7* = 313,678.8 Lbs. VOC

*Dividing by 7 assumes one day in port

Total VOC losses:
Ship Loading: 3,003.4 Lbs. VOC + Barge Loading: 0 Lbs. VOC + Ballasting: 259,314.3 Lbs. VOC + Transit: 313,678.8 Lbs. VOC = 575,996.5 Lbs. VOC.

575,996.5 Lbs. VOC / 2000 lbs/ton = 288.0 tpy VOC

With the 1990 periodic inventory, an assumption was also made that VOC losses from petroleum vessel loading operations were negligible. The 1999 periodic inventory includes about 8.4 tons per year of VOC losses from petroleum vessel loading operations at ports in Cumberland and Hancock counties. Finally, further assumptions were made by Maine DEP in 1990 that 25% of vessels transporting gasoline and 50% of vessels transporting crude petroleum were equipped with segregated ballast tanks. Currently, it is unclear on what basis these assumptions were made; therefore, they were not employed for 1999 nor for 2002.

Areas for Improvement

Maine believes that it may be significantly overestimating VOC emissions from ballasting. We should contact Connecticut DEP (who has done a survey), and the Coast Guard, to determine if there is a cost effective way to accurately assess the percentage of ships that operate in Maine with segregated ballast tanks. This activity data should be gathered for the full inventory years (1990, '93, '96, '99, and 2002)

The *Waterborne Commerce of the United States* (2002) had no reported imports, exports, shipments or receipts of jet naphtha. Therefore, we are reporting no emissions for SCC 2505020150: *Petroleum and Petroleum Product Transport: Marine Vessel: Jet Naphtha.*

References

1. *Waterborne Commerce of the United States*. Institute for Water Resources, U.S. Army Corps of Engineers, Alexandria, Virginia. Calendar Year 2002.

2. EIIP Document Series, Volume III: *Chapter 12 Marine Vessel Loading, Ballasting and Transit*. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised Final, January 2001.

3. AP-42, Fifth Edition Volume 1 Chapter 5.2: *Transportation and Marketing of Petroleum Liquids.*

5.6.8 Underground Tank Breathing and Emptying

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the Underground Tank Breathing and Emptying category (SCC: 2501060201) for the 2002 NEI.

Maine 2002 Methodology

This category covers standing tank working losses and includes evaporation of gasoline vapors from the storage tank and from the lines going to the pumps during transfer of gasoline.

Emission Factor

The emission factor is 1.0 pound VOC per 1,000 gallons of gasoline throughput. County apportionment is by vehicle miles traveled (VMT) which is provided by the Maine Department of Transportation. There is no seasonal apportionment, as per EIIP guidance, operations are assumed to be seven days per week.

HAP emissions are calculated as speciated percentages of the VOC emissions, as listed in 1999 NEI Stage I and Stage II documentation.

Pollutant	HAP weighted percentage
Benzene	0.73%
Naphthalene	0.05%
Hexane	1.52%
Toluene	1.22%
2,2,4-Trimethylpentane	0.76%
Xylene	0.46%
Ethyl Benzene	0.10%
Cumene	0.01%
Methyl Tert-Butyl Ether	1.34%

Sample Calculation

Total Gasoline Sales in Maine in 2002 * % Actual 2002 VMT for County
= Gasoline Sales for County in 2002

VOC (tpy) = Gasoline Sales in County * 1.0 lb VOC per 1,000 gal * 1 ton/2,000 lb

HAP (tpy) = VOC (tpy) * % HAP

Cumberland County Example

Total Gasoline Sales in Maine in 2002	796,722,000 gallons
Total VMT for Maine in 2002	14,652,520,580 vehicle miles traveled
Cumberland County VMT in 2002	3,059,057,700 vehicle miles traveled

Cumberland County %VMT = 3,059,057,700 vehicle miles traveled / 14,652,520,580 vehicle miles traveled
= 20.88%

Gasoline Sales in Cumberland County = 796,722,000 * 20.88%
= 166,334,424 gallons or 166,334.424 – 1,000 gallons

166.334.424 – 1,000 gallons * 1.0 lb VOC per 1,000 gallons * 1 ton / 2,000 lbs
= 83.17 ton VOC for Cumberland County

Benzene (tpy) = 83.17 tons VOC * 0.73% Benzene
= 0.6 tons Benzene in Cumberland County

References

1. EIIP Document Series, Volume III: *Chapter 11, Gasoline Marketing (Stage I and Stage II)*. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised Final, January 2001. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii11_apr2001.pdf

2. "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants" (Version 3), U.S. Environmental Protection Agency, August 2003.

3. Department of Energy, Energy Information Agency. Total Sales of Gasoline Throughput for Maine. http://www.eia.doe.gov/emeu/states/oilsales_trans/oilsales_trans_me.html.

5.6.9 Petroleum Product Transport; Tank Trucks in Transit

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the Tank Trucks in Transit category (SCC: 2505030120) for the 2002 NEI.

Maine 2002 Methodology

This category includes VOC emissions from the evaporation of gasoline vapor (1) from loaded tank trucks during transportation of gasoline from the bulk plant/terminal to the service station or other dispensing outlet, and (2) from empty tank trucks returning from service stations to bulk plants/terminals.

Maine uses Alternative Method 2 as described in the EIIP, Volume 3, *Chapter 11: Gasoline Marketing (Stage I and Stage II)* document. Statewide gasoline throughput, as obtained from the Department of Energy, is allocated by county according to vehicle miles traveled (VMT).

The formula for calculating emissions is:

TTE = ((TGD * LEF * GTA) + (TGD * UEF * GTA)) / 2000

where:

TTE = Total gasoline emission from tank trucks in transit (tons)
TGD = Total gasoline delivered to county (as allocated by VMT), (1,000 gallons)
LEF = Loaded tank truck in-transit emission factor (0.005 pounds per 1,000 gallons)
UEF = Unloaded tank truck in-transit emission factor (0.055 pounds per 1,000 gallons)
GTA = Gasoline Transport Adjustment factor (National Default is 1.25)

VOC emission factors are from EIIP, Volume 3, Chapter 11, Table 11.3-1, "VOC Emission Factors for Gasoline Marketing Activities." Simplifying the above equation:

TTE = [TGD] * (([LEF] * [GTA]) + ([UEF] * [GTA])) / 2000

A simplified emission factor can then be derived from the emission and adjustment factors above:

TTE (VOC) = (([LEF] * [GTA]) + ([UEF] * [GTA]))

= ((0.055 * 1.25) + (0.005 * 1.25))
= 0.075 lbs VOC / 1000 gal

Therefore, the simplified equation is:

VOC = ([TGD] * (0.075 lbs VOC/ 1000gal)) / 2000

HAP speciation profile is from 1999 NEI documentation (August 2004) on Stage I emissions.

Pollutant	HAP weighted percentage
Benzene	0.73%
Naphthalene	0.05%
Hexane	1.52%
Toluene	1.22%
2,2,4-Trimethylpentane	0.76%
Xylene	0.46%
Ethyl Benzene	0.10%
Cumene	0.01%
Methyl Tert-Butyl Ether	1.34%

Sample Calculation for Cumberland County

TTE (VOC) = [TGD] * (0.075 lbs VOC / 1,000 gal) / 2000

TGD for Cumberland County = 796,708.52 – 1,000 gallons throughput Maine * 21% of Statewide VMT in Cumberland County = 168,910.2 – 1,000 gal of gasoline throughput in Cumberland County.

TTE(VOC) = 168,910.2 * 0.075 / 2,000 = 6.33 tons VOC in Cumberland County

Benzene:

TTE (Benzene) = 6.3 tons * 0.73% = 0.046 tons of Benzene in Cumberland County

References

1. EIIP Document Series, Volume III: *Chapter 11, Gasoline Marketing (Stage I and Stage II)*. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised Final, January 2001. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii11_apr2001.pdf

2. "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants" (Version 3), U.S. Environmental Protection Agency, August 2003.

3. Department of Energy, Energy Information Agency. Total Sales of Gasoline Throughput for Maine. http://www.eia.doe.gov/emeu/states/oilsales_trans/oilsales_trans_me.html.

5.7 MANUFACTURING & OTHER INDUSTRIAL PROCESSES

5.7.1 Asphalt Concrete Manufacturing: Rotary Dryer at a Conventional Plant

EPA developed emission estimates prior to 1999 for this source category (SCC: 305002011), during MACT rule development. EPA added HAP emission estimates based on these calculations to the1999 NEI, and intends to carry-over the estimates into the 2002 NEI. However, EPA has not provided documentation on how these emission estimates were calculated, and activity data has likely changed since the emission estimates were made. Further, in its preliminary NEI development plan (January, 2004 version), EPA was trying to decide if this source category was covered under the point sources.

Maine believes that this category is adequately reported in its point source inventory and will no longer be reporting emissions for this category.

5.7.2 Asphalt Paving: Cutback

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating emission estimates from Asphalt Paving: Cutback (SCC: 2461021000) for the 2002 NEI.

Methodology

There are three types of asphalt paving used for road paving and repair: cutback asphalt, emulsified asphalt, and hot-mix aggregates or road oils. The majority of use in Maine is the last category[29], which is identified as a point source. Emulsified asphalt is a liquefied road surface, but is prepared with a water/soap mixture instead of petroleum distillates. Cutback asphalt is also a liquefied road surface prepared by blending (or "cutting back") asphalt cement with different petroleum distillates. Cutback asphalt emits more VOCs, and its use has been limited in Maine to the non-ozone period of October 15 to April 15. However, upon surveying the major asphalt producers and the Maine DOT, it was determined that cutback asphalt is not used in Maine, even during the non-ozone season.[30]

According to the U.S. Department of Energy (DOE), Energy Information Administration (EIA), Maine used a total of 334 Thousand Barrels of "Road oils and Asphalt" for 2000.[31] Through a telephone survey of the major asphalt plants and Maine DOT, it was determined that only hot-mix aggregates were used.[32] After guidance from EPA New England,[33] Maine was recommended to use 20% of the total from DOE for cutback asphalt. Emissions were apportioned to the county level using the ratio of county VMT to statewide VMT and applying the emission factor of 70% VOC content by weight.[34] The yearly total of VOCs was then apportioned to 260 workdays to determine the tons per summer weekday. Emissions calculated are lower than previous Periodic Emission Inventories, primarily because some cutback use was assumed in those inventories. Growth factors were used to project the 2000 Paving Asphalt data to 2002.

[29] DOT Richard Steadmen, February 20, 2002 telephone conversation documented in Asphalt in Maine.doc
[30] *Ibid.*
[31] U.S. Department of Energy, Energy Information Administration, http://www.eia.doe.gov/emeu/states/sep_use/ind/use_ind_me.html
[32] Asphalt Institute of Maine, February 20, 2002 telephone conversation documented in Asphalt in Maine.doc
[33] EPA email correspondence Mcconnell.Robert@epamail.epa.gov, Wednesday, February 20, 2002 5:23 PM Documented in Asphalt in Maine.doc
[34] EPA, Compilation of Air Pollution Emission Factors, AP-42. Section 4.5, July 1997.

Hazardous Air Pollutant (HAPs) were calculated by guidance from the EPA Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants, August 30, 2003 as percent speciated from VOC emissions.[35]

Sample Calculation

- No seasonal variation assumed
- Activity of five days per week
- Emission factor of 9.2 lbs. VOC/barrel
- BLS adjusted growth factor of 1.056143 for SCC: 2461021000 to project 2000 data to 2002
- HAP % speciation.

Cumberland County Example

Cumberland VMT percentage for 2002:

3,059,057,700 VMT / 14,652,520,580VMT Maine Total X 100 = 20.88%

Apportionment of DOE amount of Asphalt to Cutback:

335,000 Barrels X 20% Cutback = 67,000 Barrels for Cutback

Emulsified Asphalt Emissions:

67,000 barrels X 88 pounds VOC per barrel = 5,896,000 pounds VOCs State total

County Apportionment:

5,896,000 pounds VOCs State total X 20.88% VMT Cumberland County = 1,230,928 pounds VOCs

Conversion to tons:

1,230,928 pounds VOCs / 2,000 pounds per ton = 615.46 Tons VOC for 2000

Growth Projection Formula:

{(Growth factor target year - Growth factor Base year)/ Growth factor base year } + 1

Adjusted Growth Factor:

{(1.1889 - 1.1257) / 1.1257} = 1.056143

Growth Projection Calculation:

615.46 Tons VOC for 2000 X 1.056143 Adjusted Growth Factor = 650 Tons VOCs 2002 for Cumberland County.

HAPs: Toluene

Toluene is 6.4% of VOC emissions.

650 Tons VOC X 6.4% Toluene = 41.6 Tons Toluene for Cumberland County in 2002.

[35] EPA Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants, August 30, 2003. File: nonpt99ver3_aug2003.pdf, page A-7.

5.7.3 Asphalt Roofing Materials Manufacturing

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

At this time, Maine is accepting EPA's preliminary 2002 NEI estimates for Asphalt Roofing Materials Manufacturing (SCC: 2306010000) as described in the "Documentation for the 2002 Nonpoint Source National Emissions Inventory for Criteria and Hazardous Pollutants."[36] This information indicates that the values from the 1996 NTI[37] will be carried forward to 2002.

This documentation references the EPA Emissions Standard Division (ESD) as the source of the 1996 base-year values (See Table 3-1, MACT 418 Category, and Table 2-2). Maine has no emissions for this category according to the 2002 preliminary data.

Shortcomings and Areas for Improvement

The activity data for this source category is likely to have changed since 1996. Maine DEP could review business manufactures to determine if there is any manufacturing activity in this sector. If there is significant activity, Maine DEP would then consult with the EPA's ESD to determine emission estimation methodologies. However, calculations from this source should be a low priority, given the low likelihood of significant emissions, the large time and effort necessary to obtain ESD methodologies, and the time and resource-consuming nature of the methodologies generally employed by ESD.

5.7.4 Chrome Electroplating: Chromic Acid Anodizing, Decorative, Hard Electroplating

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

EPA did not conduct new calculations for this source category in the preliminary 2002 NEI, because the 2002 activity data was not available. EPA carried the 1999 estimates forward for this category.

Maine has two known electroplaters[38] that report to the Toxics Point Emission Inventory: Silvex (32 lbs chromium/yr) and General Dynamics (12 lbs chromium/yr). Chapter 137 allows facilities to simply report the volume of chemicals used if they do not know the actual emissions. Maine DEP confirmed that the values for the two point sources are emission numbers, and not "use" numbers. Chrome emissions from these two sources total 44 lbs/year, which is orders of magnitude higher than the estimates derived using EPA's methodology. That is, subtracting out Maine's known point sources from EPA's estimates of the total Maine emissions, results in a negative number for area sources. Therefore, Maine submitted an estimate of zero area source emissions for these three source categories, while capturing chromium emissions in the point source inventory.

5.7.4.1 Chromic Acid Anodizing

EPA Methodology

The following descriptions of EPA calculation methodologies for chromic acid anodizing (SCC: 2309100050) are taken from "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia: Area Sources." Emission Factor and Inventory Group, Office

[36] EPA, File: 2002prelimneinonpoint_032004.pdf, page 2-6.
[37] EPA File: 2002prelimneinonpoint_032004.pdf, page 3-2.
[38] The NAICS code (332813) and SIC code (3471) for these facilities are generic codes for electroplating, and not just chromium electroplating. Thus these facilities by result in an over counting for chrome electroplating emissions.

of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, January 31, 2004.

EPA estimated that the total national emissions from Chromic Acid Anodizing for 1993 was 3.90 tons[39] of chromium. EPA assumed the activity level between 1993 and 1999 was steady. The Federal Register indicates that these emissions are solely from large plants (. 60 million ampere-hours). The 1999 emission estimates must take into account a 99% reduction due to promulgation of MACT standards[40] for major and area sources. EPA presumed 100% rule effectiveness. EPA assumed that the area emission comprised 95% of the total emissions.

Sample Calculation

Chromic Acid Anodizing = (Small Plant Emissions + Large Plant Emissions)* (100% - 99% reduction)*(95% area)
= (0.00 tons/yr +3.90 tons/yr) *(0.01)*(0.95)
= 0.03705 tons/yr
=74 lbs/yr emitted in the United States

EPA then allocated emissions to the county-level based upon number of employees in SIC Code 3471, Plating and Polishing, as reported to the 1999 County Business Patterns[41].

5.7.4.2 Decorative Chromium Electroplating

EPA Methodology

EPA estimated that the total national emissions from Decorative Chromium Electroplating (SCC: 2309100030) for 1993 were 11.50 tons[42]of chromium. EPA assumed the activity level between 1993 and 1999 was steady. The Federal Register indicates that these emissions are solely from large plants (. 60 million ampere-hours). The 1999 emission estimates must take into account a 99% reduction due to promulgation of MACT standards[43] for major and area sources. EPA presumed 100% rule effectiveness. EPA assumed that the area emission comprised 95% of the total emissions. Thus:

Sample Calculation

Decorative Chromium Electroplating = (Small Plant Emissions + Large Plant Emissions)* (100% - 99% reduction)*(95% area)
= (0.00 tons/yr +11.50 tons/yr) *(0.01)*(0.95)

[39]National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks. Federal Register 58. Page 65768 and 65786. December 16, 1993.
[40] National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks; Final Rule. Federal Register 60. Page 4955-56. January 25, 1995.
[41] County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001
[42] National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks. Federal Register 58. Page 65768 and 65786. December 16, 1993.
[43] National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks; Final Rule. Federal Register 60. Page 4955-56. January 25, 1995.

= 0.10925 tons/yr
= 218.5 lbs/yr Emitted in the United States

EPA then allocated emissions to the county-level based upon number of employees in SIC Code 3471, Plating and Polishing, as reported to the 1999 County Business Patterns[44].

5.7.4.3 Hard Chromium Electroplating

EPA Methodology

EPA estimated that the total national emissions from Hard Chromium Electroplating (SCC: 2309100010) for 1993 was 159.6 tons[4] of chromium. EPA assumed the activity level between 1993 and 1999 was steady. The Federal Register indicates that these emissions are from small (< 60 million ampere-hours) and large plants (. 60 million ampere-hours). The 1999 emission estimates must take into account a 99% reduction due to promulgation of MACT standards[5] for major and area sources. EPA presumed 100% rule effectiveness. EPA assumed that the area emission comprised 95% of the total emissions. Thus:

Sample Calculation

Hard Chromium Electroplating = (Small Plant Emissions + Large Plant Emissions)* (100% - 99% reduction)*(95% area)
= (20.30 tons/yr +139.30 tons/yr) *(0.01)*(0.95)
= 1.5162 tons/yr
= 3032 lbs/yr emitted in the United States

EPA then allocated emissions to the county-level based upon number of employees in SIC Code 3471, Plating and Polishing, as reported to the 1999 County Business Patterns[45].

Maine Methodology for all Chrome Plating Activities

A. Maine DEP estimated releases from these source codes by first deriving a “per-employee emission factor” from EPA’s work as follows:

   Chrome emitted nationally 1999 (t/yr) / national employment 1999 = tons/employee

   This emission factor took into account the MACT standards and a 100% rule effectiveness.

B. Maine DEP then multiplied this emission factor to 1999 employment data for SIC Code 3471, Plating and Polishing, using the following formula:

   Tons/employee x employees per county = tons/yr/county

   Since employment values were generally given in a range, Maine DEP used the median value in the range.

C. Maine DEP then grew out 1999 activity data to 2002 values, using the following formula:

[44] County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001
[45] County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001

1999 chrome emission * {1+(2002 growth factor – 1999 growth factor)/1999 growth factor) = 2002 estimated chrome emission for chromic acid anodizing

Maine derived growth factors using the following formula:
growth factor = emission for base year *(1+(proj yr gf - base yr gr)/(base yr gf))

Areas for Improvement

EPA's estimates are fairly small for this source category, particularly in light of Maine's HAP point source inventory program. Maine DEP should stop running calculations for the area portion of this source category, and simply report the point source emissions. Recent revisions to Maine's HAP inventory program, promulgated in chapter 137, have dropped the reporting threshold for chromium and compounds to 10 pounds per year.

Maine DEP could derive a state emission factor based on the number of employees and release volumes from the two point sources. The employee emission factor could then be applied to unaccounted for employment data to quantify other release volumes.

5.7.5 Cotton Ginning

Cotton ginning (SCC: 2801000000) does not occur in Maine. Therefore it is not included in this inventory. States with cotton ginning sources are listed in Appendix A of the "Documentation for the 2002 Nonpoint source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version)."

5.7.6 Flexible Polyurethane Foam Production

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

In EPA's 2002 NEI preparation plan for its preliminary estimations of 2002 emissions from this source category (SCC: 30101880), EPA is proposing to roll forward the 1999 NEI estimations. EPA's 1999 estimations for this source category were based on ESD calculations that were done for MACT rule development.

Maine DEP believes that the estimations in the 1999 NEI are erroneous. The largest contributing point source already submits data to the point source HAP inventory. The other source has emissions below our reporting threshold. Since the majority of emissions are captured in the point source database, this category was deleted as an area source category.

EPA 1999 Methodology

In the 1999 NEI, "Foam Production – General Process" is the area source category that generated the highest toxicity-weighted emissions in the state. If correct, these chromium emissions would have tripped the reporting thresholds under Chapter 137. Either the emission information was incorrect, or a major emission source had failed to report.

Maine DEP queried EPA as to the source of the emissions information that was in the 1999 NEI and how EPA arrived at this estimate. EPA noted that the source code for the information indicated that the information originated from the state (of Maine - which prompted EPA to ask how Maine DEP came up with the number). It appears to Maine DEP that the chromium number was an error. A preliminary review of the 1999 inventory documentation did not readily identify the source of the error. Rather than retracting the labyrinth that lead to the error in 1999 emissions, Maine DEP determined that it made more sense to use the time to obtain current emission numbers.

Maine 2002 Methodology

Maine DEP reviewed Maine business/manufactures directories and identified three facilities that had potential to manufacture foam products, and then contacted these facilities. Maine DEP discussed with these facilities other potential manufactures in Maine. Maine DEP also reviewed HAP emission statements filed under Chapter 137. It determined that:

- **Rynel (Lincoln county)** used/emitted 2,4-toluene diisocyanate, but at levels that were below the old chapter 137 reporting threshold. Rynel may be required to report under the revised Chapter 137 reporting thresholds. (Rynel emits less than two pounds of 2,4,-toluene diisocyanate. They do not emit chromium compounds or any other hazardous air pollutants.)

- **Enefco (Androscoggin County)** filed a HAPs emissions statement under Chapter 137, and is therefore already included in the 2002 HAP point source inventory. The following SICs are associated with the facility:
  3131 - footwear components,
  3544 - die cutting, slitting,
  3089 - cosmetic applicators.
  In 2002, Enefco reported using/emitting 12,630 lbs/year of 2,4-toluene diisocyanate. In recent discussion with Enefco (Spring 2005), it was determined that their emissions are less than 20 pounds per year.

- **Thermal Fab (Cumberland county)** only installs foam in refrigeration equipment and does not produce foam products. It’s only emissions would be from adhesives used to glue the foam on, which would already be covered under the commercial and consumer products portion of the 2002 HAP area source inventory.

- **Johns Mansville (Androscoggin and Cumberland)** no longer has any facilities that produce cyanate based foams.
  - Johns Mansville in Lewiston/Auburn (Androscoggin) has a facility that produces roofing supplies, but not foam products. This facility files emissions reports under Chapter 137, and therefore is already included in the 2002 HAP point source inventory
  - Johns Manville in Portland (Cumberland County) is an administrative office. It has a small job shop doing work for the Lewiston plant.

5.7.7 Refractors Manufacturing

EPA showed no emissions or entries in the database for Refractory Manufacturing (SCC: 2305000000). Maine DEP reviewed the source list of potential MACT sources that EPA provided and the associated SIC codes. Maine DEP found no refractory manufacturing on this list. Tower Publishing’s “Maine 2003 Manufacturing Directory” showed one source, Zampell, in Auburn. Maine DEP contacted the facility and ascertained that the facility installs and repairs, but they do not manufacture, refractors. Therefore, **Maine DEP confirmed that emissions from this source are zero and will no longer be calculating or reporting emissions for this category.**

5.7.8 Rubber and Plastics Manufacturing

Maine DEP decided to delete emissions from the category of Rubber and Plastics Manufacturing (SCC: 2430000000).

The data contained in EPA's preliminary 2002 NEI was carried over from the 1999 NEI. However, the 1999 documentation doesn't say how these emission estimates were prepared. EPA is in the process of updating the entire nonpoint solvent use and they have some preliminary solvent consumption data in house that is under review. These new data will eventually be used to update the solvent consumption emission estimates for nonpoint sources in the NEI. These new data are more current than the data that the emission estimates used for the 1999 NEI. When EPA scanned through the new data, they found no entries for SCC 2430000000. Therefore, Maine had decided not to include any entries for Rubber and Plastics Manufacturing and has removed the category for the 2002 nonpoint inventory.

5.7.9 Steel Pickling with Hydrochloric Acid

EPA developed emission estimates for Steel Pickling with Hydrochloric Acid (SCC: 2303000000) prior to 1999, during MACT rule development, for this source category. EPA added HAP emission estimates based on these calculations to the1999 NEI, and intends to carry-over the estimates into the 2002 NEI. However, EPA has not provided documentation on how these emission estimates were calculated, and activity data has likely changed since the emission estimates were made.

Maine DEP has reviewed the emission estimates and has decided to delete this area source category. The sources that perform steel pickling report in our point source HAP inventory.

5.7.10 Industrial Refrigeration Losses

Maine DEP contact: David Wright (207)287-2437 or David.W.Wright@Maine.gov

Maine reviewed and accepts the methodology approach for Industrial Refrigeration Losses (SCC: 239901000) generated by Pechan for MARAMA. Therefore, the emission estimates attributed by Pechan to Maine's counties are assumed to be correct.

<u>MARAMA Methodology</u>

Descriptions of the methodology were taken from "Technical memorandum: MANE-VU 2002 Ammonia Emissions Inventory for Miscellaneous Sources" – Final; March 31, 2004. Prepared for MARAMA, Mid Atlantic Regional Air Management Association, 711 W. 40th Street, Suite 318, Baltimore, MD 21211-2109 by E.I. Pechan and Associates. This report can be found at http://www.marama.org/visibility/Ammonia/Final_Tech_Memo.pdf. Other supporting documents such as the calculation sheet and data base can be found at http://www.marama.org/visibility/Ammonia/.

The MARAMA Calculation Methodology for Industrial Refrigeration Losses of Ammonia (NH3) for SCC 2399010000 (Industrial Processes; Industrial Refrigeration; Refrigerant Losses; All Processes) refers to fugitive refrigerant losses of ammonia from industrial refrigeration systems. A new EIIP document provides new information for estimating these emissions (Pechan, 2004a).

Prior to the development of the new EIIP document, there were no methods available to estimate emissions from this category (Pechan, 2004a). Pechan developed an ammonia emissions inventory for the region in 2002 using an employee-based emission factor (30 lb/employee-yr) from the EIIP document and data from the MANE-VU states (Pechan, 2004b). The EIIP emission factor is applied to county-level employment data for the following standard industrial classification (SIC) or North American industrial classification system (NAICS) codes:

SIC Code	Description	NAICS Code
2011	Meat Packing Plants	311611
2013	Sausages/Other Prepared Meats	311612, 311613
2015	Poultry Slaughtering/Processing[a]	311615
2021-2026	Dairy Products	311512-311514, 31152
2032-2038	Dried, Canned, Frozen Fruits/Vegetables	311411, 311412, 311421-311423
2051-2053	Bread and Bakery Product Mfg.	31181
2064, 2066	Chocolate and Confectionery Mfg.	31132, 31133
2082-2086	Malt Beverages, Wines, Liquors, Soft Drinks	31211-31213
2091-2092	Canned, Fresh or Frozen Seafood	31171
2097	Ice Manufacturing	312113
2099	Food Preparations, not elsewhere classified	311991, 311999
2821	Plastics Material and Resin Mfg.	325211
4222, 4226	Refrigerated Warehousing & Storage	49312
514x	Various Food Wholesalers	4224, 311612
518x	Various Beverage Wholesalers	42281,42282

[a]Sometimes listed under 1123xx “Poultry & Egg Production”.

Delaware supplied point-level estimates of ammonia refrigeration losses from survey work conducted by that state. Those estimates were used in place of the estimates derived from the employee-based emission factor. Pechan (2004b) developed additional point-level emissions data for the remaining MANE-VU states.

<u>Sample Calculation</u>

A. Annual Emissions
NH_3 emissions can be calculated in tons/year for industrial refrigeration losses as follows:

$$EM_{NH3} = (G \times EF_{NH3}) / 2000$$

Where:
EM_{NH3} = County-level annual ammonia emissions from industrial refrigeration losses (tons).
G = County-level employment (employees).
EF_{NH3} = Ammonia emission factor of 30lb/employee (Pechan, 2004a)

Point Source Adjustments: Some states may have emissions data for point sources. Estimated area source emissions should be adjusted by subtracting the activity attributable to point sources (i.e. employment by SIC or NAICS) prior to estimating the area source emissions. If point source employment data are not available, adjustments should be made by subtracting the point source emissions from the area source estimate. See EIIP Volume III, Chapter 1, Section 4 for methodology to account for point sources in an area source emissions inventory.

Adjustments for Controls: There are no known regulations that apply to industrial refrigeration losses.

Spatial Adjustments: Pechan provided county-level emission estimates for the MANE-VU region (Pechan, 2004b). DE provided point source data. Pechan also developed point-level estimates for a portion of the inventory for the rest of the MANE-VU states (see Section XIII).

Temporal Adjustments: Based on available information, emissions from industrial refrigeration losses are assumed to be uniform through the year.

Assumptions: The EIIP emission factor (based on data from the South Coast Air Quality Management District) is representative of industrial refrigeration losses occurring in the MANE-VU region.

Rule Effectiveness: Not applicable.

Areas for Improvement

Pechan (2004b) developed information on point-level releases by extracting information from EPA's Risk Management Program (RMP) database. Pechan extracted all facilities that appeared to use an industrial refrigeration system. Since information on fugitive releases was not available in the RMP data, Pechan surveyed a sample of these facilities to gather information on the amount of NH_3 typically added to the system each year or the total amount of NH_3 added during the preceding few years. Pechan estimated that for these larger facilities (>10,000 lb capacity systems subject to RMP requirements) that the average capacity was 32,000 lb and that the annual loss rate was 8%.

Pechan attempted to gather additional information on smaller capacity systems (>500 lb capacity) subject to SARA Tier II reporting requirements; however insufficient data were obtained to develop loss rates for these facilities (Pechan, 2004b). Much of this is due to the current sensitivity surrounding both the RMP and SARA Tier II data. States may have better access to these data in the future, which could improve the emission estimates. With the exception of DE, the current county-level MANE-VU estimates are based on the EIIP emission factor since this county-level estimate always exceeded RMP "point-source" total for that county.

The only reasonable data for comparison of the estimate produced from the EIIP employment-based emission factor are the data from DE. This comparison indicates that the EIIP emission factor probably produces order of magnitude estimates with a high probability of emissions over-estimation. Future recommendations in the EIIP call for additional analysis and refinement of the employment-based emission factor since these emissions can be important contributors in urban areas.

References

1. Pechan. Estimating Ammonia Emissions from Anthropogenic Sources – Draft Report, prepared for the US EPA, Emissions Inventory Improvement Program, prepared by E.H.Pechan & Associates, Inc. March 2004.

2. Pechan. Technical Memorandum: MANE-VU 2002 Ammonia Emissions Inventory for Miscellaneous Sources, FINAL, prepared for the Mid-Atlantic Regional Air Management Association, prepared by E.H. Pechan & Associates, Inc. April 2004. "

5.8 Mining and Quarrying

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine accepts the methodology approach for PM emissions for Mining & Quarrying (SCC: 232500000) as presented in the 1999 NEI. Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 1999 Methodology

Descriptions of methodology as taken from "Documentation for the Final 1999 National Emissions Inventory (Version 3.0) for Criteria Air Pollutants and Ammonia: Area Sources." Emission Factor and Inventory Group, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, January 31, 2004.

1999 $_{PM10}$ emissions were estimated by:

1) Obtaining regional metallic and non-metallic crude ore handled at surface mines from the U.S. Geologic Survey;

2) Obtaining coal production data for surface mines from the Energy Information Administration;

3) Estimating State withheld data using known distributions from past years;

4) Applying $_{PM10}$ emission factors to the activity data to develop emissions for metallic ore, non-metallic ore, and coal mining operations; and,

5) Distributing total emissions from the regional-level to the county-level by dividing regional emissions by the number of counties in each region. $_{PM2.5}$ emissions are determined by multiplying 1999 $_{PM10}$ emissions a particle size adjustment factor of 0.2.

Emission Factors
Metallic Mining $_{PM10}$: 0.054761 lb/ton
Non-Metallic Mining $_{PM10}$* : 0.29328077 lb/ton
Coal Mining $_{PM10}$* : 0.5133 lb/ton

Areas for Improvement

The numbers are determined on a regional level then distributed equally between the counties in the regions. This result in equal emissions for PM-10 and PM-2.5 for all the counties in Maine. PM-10 emissions are 178.94 tons and 35.79 tons for PM-2.5 emissions. These could be refined by distributing based on the inverse of population or based on other mining/quarrying activity such as rock crushing or by employment activity for this SCC/SIC code.

References

1. *AIRS Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Air Pollutants*. EPA-450/4-90-003. Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC. March 1990.

5.9 OPEN BURNING & OTHER COMBUSTION

5.9.1 Open Burning: Forest and other Wildfires

Maine DEP contact: David Wright (207)287-2437 or David.W.Wright@Maine.gov

Maine has updated emission estimates for Open Burning: Forest and Wildfires (SCC: 281000100) for 2002. The high estimate by EPA of acres burned in wildfires in Maine, coupled with the high fuel loading per acre burned, resulted in a significant over estimation of the criteria and HAP emissions from this category. These inflated numbers appeared in both the 1999 National Emissions Inventory (NEI 3.0) and the 2002 preliminary National Emission Inventory. Maine DEP has used a method to correct this overestimation.

Data from the 1999 National Emissions Inventory (NEI) version 3.0, and the 2002 preliminary NEI, suggest that one of the largest nonpoint sources of air pollutants is derived from forest fires. However, those calculations were based upon a highly inflated loading rate, or the tons of fuel consumed on each acre of area burned. Additionally, EPA's top down approach to apportioning forest fires to Maine also over estimates the number of acreage burned in the state. This, in turn, has lead to inflated estimates of HAP and Criteria Pollutant releases from this source category. Maine DEP has used local information to refine these factors to produce a more accurate emissions estimate from this source category.

Maine 2002 Methodology

The methodology for calculating emissions from forest and other wildfires was adopted from the 1999 NEI methodology, and considered short-term improvements recommended to EPA in November of 2003[46]. Maine DEP obtained activity data from the Maine Forest Service. Maine DEP developed a loading factor based upon average forest types in Maine and available NFDRS fuel types. Criteria pollutant emission factors are from EPA's recommended improvements document, and HAP emission factors are from 1999 NEI documentation September 2002.[47] County apportionment was according to the actual acres burned by wildfires within the county. Seasonal apportionment was over 182.5 days/year.

Derivation of Acres Burned: EPA estimated the acres burned in Maine by compiling the total acreage burned in the US from a variety of federal sources[48], and then allocated this value to each state. For 2002, EPA estimated that the number of acres burned in Maine was 2,157. These total numbers were then apportioned to the county level using the Biogenic Emissions Land Cover Database. Maine DEP obtained the actual number of acres burned in 2002 in each Maine County from the Maine Forest Service database, for a total of 792 acres, as shown in 5.9.1-A. This includes wildfires on private and public land, but does not include prescribed burns.

[46] EC/R Incorporated , Data Needs and Availability for Wildland Fire Emission Inventories – Short-term Improvements to the Wildland Fire Component of the National Emissions Inventory, Table 2. Emission Factors for Criteria Pollutants, November 17, 2003
[47] EPA file: nonpt99ver3_sept2002.pdf, page A-57.
[48] ERG, Inc for EPA, Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (version 3), appendix A, August 6, 2003.; and
EH Pechan & Associates for EPA, Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants, Appendix A (January 2004 Version)

Table 5.9.1-A: Forest and other Wildfires in Maine by County for 2002, as compiled by the Maine Forest Service

County	Acres Burned by Habitat type					
	FOREST	BRUSH	SLASH*	GRASS	MARSH / BOG	Total
Androscoggin	8.36	3.01	0.5	19.41		31
Aroostook	75.81	0.97	0.2	200.25	1.6	279
Cumberland	15.92	1.82	2.7	8.16		29
Franklin	3.77	1.6	3.5	0.27		9
Hancock	12.2	1.7	0.5	2.7	11	28
Kennebec	59.75	11.53	0.5	5.67		77
Knox	0.2	2.21	0.3	9.49		12
Lincoln	1.85	1.42	0.65	7.75		12
Oxford	10.31	11.23	1.5	2.97	0.2	26
Penobscot	40.45	2.75	4.2	14.25		62
Piscataquis	108.66	3.37	2.5	2.46		117
Sagadahoc	4.91	0.97	1.05	2.41	0.06	9
Somerset	12.96	1.09	1.47	3.86		19
Waldo	9.51	2.45	2.15	3.27	0.5	18
Washington	9.45	16.9	2	13.9		42
York	7.7	6.29	1.1	4.41	1.01	21
Total	382	69	25	301	14	792
*Note: The fires reported by the Maine Forest Service (Mary Casey) as "slash" required suppression help so were considered wildfires						

Derivation of EPA's Fuel Consumption Factor: EPA derived a fuel consumption factor of 27.8 tons of fuel burned for each acre of land burned in any type of wildfire in Maine. The derivation of this factor was somewhat described in a November, 2003 EPA report[49]. This report further referenced a method in the 1992 Western Regional Air Partnership (WRAP) documentation of its1996 Fire Emission Inventory[50], specifically a method found in Section 3.4 of that report. In this method, fuel loading factors are assigned to certain forest types that are found in the western United States. These factors were then applied to Maine's forest types. It appears that EPA assigned loading factors for regions of the Northwestern forests to Maine. This assignment is inconsistent with the National Fire Danger Rating System's (NFDRS) Climate Class Determinations.[51] Fuel loadings in Maine should be lower than the virgin forests of the Pacific Northwest since:

- Maine's climate is colder, so tree growth is slower
- Maine's forests are regularly logged and there are only scattered, small pockets of virgin timber in Maine

[49] EC/R for USEPA Data Needs and Availability for Wildland Fire Emission Inventories: Short-term Improvements to the Wildland Fire Component of the NEI, November 17, 2003
[50] Prepared by Air Sciences, Inc, for WGA/WRAP, Draft Final Report – 1996 Fire Emission Inventory, December 2002.
[51] Paul Schlobohm and Jim Brain, NWCG Fire Danger Working Team, Gaining and Understanding of the National Fire Danger Rating System, Appendix IV, Class Determination, Figures 1 and 2 (undated – downloaded from the internet 5/5/04)

Derivation of Maine DEP's Fuel Consumption Factor for Forest Fires: Maine DEP derived a fuel consumption factor using the method described in the WRAP 1996 Wildfire Inventory Document[52]. However, for forest fires, in accordance with NFDRS Climate Class Determinations, Maine used loading factors for forest types for the southeastern U.S., since the guidance recommends these factors and they appear to be more applicable to Maine. Maine DEP first determined the distribution of forest types in Maine, from the 2002 forest Inventory completed by the Maine Forest Service and US Forest Service[53]. Maine DEP then applied NFDRS fuel consumption values[54] by matching the closest NFDRS forest classification to the forest types found in Maine, to derive a weighted average fuel consumption value based on forest types found in Maine.

Inherent in this method is the assumption that 60% of the acreage burned involves a canopy fire, while 40% involves understory fires. While most fire events in Maine involve only the understory, the canopy fires are the larger fires that consume more acres.

The method also apportions factors for smoldering to the fuel consumption values in most of the fire classes applied to Maine. When WRAP did not include a smolder factor in its original fuel loading factor, a 17% smolder factor was applied in accordance with the method EPA used to derive the loading factors for the preliminary 2002 NEI[55].

Table 5.9.1-B shows the factors used to derive the 11.8 tons of fuel consumed, per acre of forested land burned. This factor is very close to the 11 tons per acre factor contained in AP-42[56], for the north central United States, based on a mixture of conifers and hardwoods.

Table 5.9.1-B: Factors used to derive a Weighted-average Wild Forest Fire Fuel Consumption factor for Maine

Forest Type Group[57]	Maine Forest Type (Thousands of Acres)[58]	Maine Forest Type (%)	NFDRS fuel Class[59]	Description[60]	Fuel Consumption by Wildfire per WRAP (tons/acre burned)*[61]	WRAP Smolder Factor (%)[62]	Weighted Average (tons fuel/forest type acre burned)
White/Red/Jack Pine	1,371.1	7.9%	P	Southern Plantation Pine	16.4	0%	1.3
Spruce/Fir	5,232.1	30.2%	H	Short Needle (Normal	27.5	0%	8.3

[52] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory
[53] Maine Forest Service & US Department of Agriculture Forest Service, October 16, 2003, Forth Annual Inventory Report on Maine's Forests - Table 2
[54] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory - Table 3.2
[55] EC/R for USEPA Data Needs and Availability for Wildland Fire Emission Inventories: Short-term Improvements to the Wildland Fire Component of the NEI, November 17, 2003
[56] EPA, Compilation of Air Pollutant Emission Factors, Volume I: Stationary point and Area Sources, Fifth Edition, section 13.1, January 1995.
[57] Maine Forest Service & US Department of Agriculture Forest Service, October 16, 2003, Forth Annual Inventory Report on Maine's Forests - Table 2
[58] Maine Forest Service & US Department of Agriculture Forest Service, October 16, 2003, Forth Annual Inventory Report on Maine's Forests - Table 2
[59] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory - Table 3.2
[60] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory - Table 3.2
[61] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory - Table 3.2

Forest Type Group[57]	Maine Forest Type (Thousands of Acres)[58]	Maine Forest Type (%)	NFDRS fuel Class[59]	Description[60]	Fuel Consumption by Wildfire per WRAP (tons/acre burned)*[61]	WRAP Smolder Factor (%)[62]	Weighted Average (tons fuel/forest type acre burned)
				Dead)			
Loblolly/Short leaf		0.0%	C	Pine Grass Savanna	4.7	17%	0
Exotic Softwood Plantations	24.3	0.1%	R	Hardwood litter (summer)	3.1	0%	0.004
Oak/Pine	374.2	2.2%	P	Southern Plantation Pine	16.4	0%	0.35
Oak/Hickory	334.6	1.9%	R	Hardwood litter (summer)	3.1	0%	0.06
Oak/Gum/Cypress	14.0	0.1%	R	Hardwood litter (summer)	3.1	0%	0.003
Elm/Ash/Red Maple	358.1	2.1%	R	Hardwood litter (summer)	3.1	0%	0.063
Maple/Beech/Birch 211	7,168.4	41.3%	R	Hardwood litter (summer)	3.1	0%	1.283
Aspen/Birch	2404	13.9%	R	Hardwood litter (summer)	3.1	0%	0.43
Nonstocked	57.6	0.3%	F	Intermediate Brush	15	17%	0.06
Total	17,338.4	100.0%					**11.8**
**Note: assumes 60% of acreage burned involves canopy fires.							

Derivation of other loading rates for Wildfires: The wildfire activity data provided by the Maine Forest Service documented the type of habitat burned. Loading factors for these habitats are likely to vary. Loading factors for wildfires in brush, slash, grass, bogs and marshland were assigned based upon similar loading factors in the WRAP report, as shown in Table 5.9.1-C.

Table 5.9.1-C: Loading factors assigned to other types of wildfires in Maine

Type of Habitat Burned in the WRAP report[63]	Tons Fuel/Acre	Applied to Maine Habitat
Intermediate Brush*	15	Brush
Sagebrush-grass*	4.5	Grass
Saw Grass*	5	Bog/Marsh
Intermediate Slash*	34	Slash
* Augmented for smoldering		

[62] EC/R for USEPA Data Needs and Availability for Wildland Fire Emission Inventories: Short-term Improvements to the Wildland Fire Component of the NEI, November 17, 2003
[63] Air Sciences, Inc for WGA/WRAP, Dec 2002, 1996 Fire Emission Inventory - Table 3.2

Emission Factors

Maine DEP used the emission factors for criteria pollutants that were published in EPA's recommended short-term improvements document for wildfires. The HAP emission factors were obtained from the 1999 NEI documentation. The emission factors that Maine DEP used are shown in Table 5.9.1-D.

Table 5.9.1-D: Emission factors used in wildfire emission estimates

Pollutant	Emission Factor	Units	Source EF obtained from	EF Primary Source
TSP	34.1	lbs./ton	3	4,5
PM10	28.1	lbs./ton	3	4,5
PM2.5	24.1	lbs./ton	3	4,5
Elemental carbon	1.5	lbs./ton	3	4,5
Organic carbon	11.6	lbs./ton	3	4,5
VOC	13.6	lbs./ton	3	4,5
CH4	13.6	lbs./ton	3	4,5
NH3	1.3	lbs./ton	3	4,5
NOX	6.2	lbs./ton	3	4,5
CO	289	lbs./ton	3	4,5
SO2	1.7	lbs./ton	3	4,5
Total Particulate Matter	17	lbs./ton	6	
1.3-Butadiene	4.05E-01	lbs./ton	1	*1, 2.
2,3,7,8-TCDD TEQ	1.47E-09	lbs./ton	1	*1, 2.
Acetaldehyde	4.08E-01	lbs./ton	1	*1, 2.
Acrolein	4.24E-01	lbs./ton	1	*1, 2.
Anthracene	5.00E-03	lbs./ton	1	*1, 2.
Benzo(a)Anthracene	6.20E-03	lbs./ton	1	*1, 2.
Benzene	1.13E+00	lbs./ton	1	*1, 2.
Benzo(a)fluoranththene	2.60E-03	lbs./ton	1	*1, 2.
Benzo(a)pyrene	1.48E-03	lbs./ton	1	*1, 2.
Benzo(c) phenanthrene	3.90E-03	lbs./ton	1	*1, 2.
Benzo(e)pyrene	2.66E-03	lbs./ton	1	*1, 2.
Benzo(g,h,I)perylene	5.08E-03	lbs./ton	1	*1, 2.
Benzo(k)fluoranthene	2.60E-03	lbs./ton	1	*1, 2.
Benzofluoranthenes	5.14E-03	lbs./ton	1	*1, 2.
Carbonyl Sulfide	5.34E-04	lbs./ton	1	*1, 2.
Chrysene	6.20E-03	lbs./ton	1	*1, 2.
Flouranthene	6.73E-03	lbs./ton	1	*1, 2.
Formaldehyde	2.58E+00	lbs./ton	1	*1, 2.
Indeno(1,2,3-cd)pyrene	3.41E-03	lbs./ton	1	*1, 2.
Methyl Chloride	1.28E-01	lbs./ton	1	*1, 2.
Methylanthracene	8.23E-03	lbs./ton	1	*1, 2.
Methylbenzopyrene	2.96E-03	lbs./ton	1	*1, 2.
Methylchrysene	7.90E-03	lbs./ton	1	*1, 2.
1-Methylpyrene	9.05E-03	lbs./ton	1	*1, 2.
n-Hexane	1.64E-02	lbs./ton	1	*1, 2.
o,m,p-Xylene	2.42E-01	lbs./ton	1	*1, 2.

Pollutant	Emission Factor	Units	Source EF obtained from	EF Primary Source
Perylene	8.56E-04	lbs./ton	1	*1, 2.
Phenanthrene	5.00E-03	lbs./ton	1	*1, 2.
Pyrene	9.29E-03	lbs./ton	1	*1, 2.
Toluene	5.68E-01	lbs./ton	1	*1, 2.
*1. Documentation for the 1999 Base Year Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants, Sep. 30, 2002.				
*2. Development of Emissions Inventory Methods for Wildfires, EPA Contract No. 68-D-98-046 Work Assigment No. 5-03. Table 39.				
3 From: EC/R Incorporated , Data Needs and Availability for Wildland Fire Emission Inventories – Short-term Improvements to the Wildland Fire Component of the National Emissions Inventory, Table 2. Emission Factors for Criteria Pollutants, November 17, 2003				
4 1996 Fire Emission Inventory. Western Governors Association/Western Regional Air Partnership. Project 178-1. 2003.				
5 Memorandum from Bruce Bayle, U.S. Forest Service, to Tom Pace, US Environmental Protection Agency, Research Triangle Park, NC. October 20, 2003.				
6 AP-42 Fifth Edition Volume 1 Chapter 13.1: Wildfires and Prescribed Burning. Supplement B				

Calculation Example

The formula used to estimate emissions is as follows:

Emissions = Acres Burned x loading factor x emission factor

Where:

Emissions	= The estimated emission from this source category by pollutant and fire type
Acres Burned	= The number of acres burned in wildfire, by type of habitat
Loading Factor	= The tons of fuel consumed per acre by fire in each habitat type
Emissions Factor	= The lbs of pollutant release for each ton of fuel burned in a wildfire

Sample Calculation for VOC emissions in Cumberland County from Wildfires in 2002

VOC Emissions (Tons/Year)	Habitat Type	Acres Burned	Loading Factor (Tons Fuel/ Acre burned)	Emission Factor (lb –VOC/ Ton Fuel Burned
2568	Forest	16	11.8	13.6
408	Brush	2	15	13.6
0	Marsh/Bog	0	5	13.6
1248	Slash	2.7	34	13.6
502	Grass	8.2	4.5	13.6
4726	**Total VOC emissions from Wildfire in Cumberland Co in 2002**			

Shortcomings and Areas for Improvement

Depending on the assumptions used, forest fires can be a dominant source of air pollution of both HAP and criteria pollutants. Maine DEP should continue to support national efforts to develop better emission inventories for wildfires, particularly those that recognize the temporal nature of forest fire events. Under the Emissions Inventory Improvement Program, EPA has three initiatives to refine the emission estimates from forest fires:

1. $50 K to Support the USFS in building a GIS-based fuel loading coverage database of the US that all stakeholders can use for fire EI's (EFIG)
2. $70 K to Support EPA-ORD in integrating the BlueSky fire emissions and modeling system with modular emissions processors and grid models (EFIG). This will allow fire emission estimates using real time meteorological conditions and modeling of the impacts in a multi-source, multi-pollutant platform using grid models.
3. $55 K for a national workshop on fire emission estimation methods and data needs (EFIG)

The Maine Forest Service does track the exact location and time of forest fires, and this information can be used to improve emission inventories.

If the refined protocols are not developed in time for the 2005 NEI, then Maine should improve the loading factors used in this methodology, in consultation with the Maine Forest Service and USEPA.

5.9.2 Open Burning: Orchard Heaters

Maine will no longer be including emissions from Orchard Heaters (SCC: 2801520000) as a nonpoint source category in the National Emissions Inventory because of zero activity data. In 1999, a telephone survey by Maine Department of Agriculture to the major orchards in Maine revealed that orchard heaters are not used in Maine. The Maine Department of Agriculture confirmed this information. Emissions in this category in 1990, 1993, 1996 and 1999 were zero because they were not used in those years either.

5.9.3 Open Burning: Prescribed Agricultural Fires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is accepting EPA's approach for estimate emissions from Open Burning: Prescribed Burning on Agricultural Fields (SCC: 2810015000) for 2002.

EPA 2002 Methodology

The following methodology description is taken from "Documentation for the 2002 Nonpoint Source National Emissions Inventory for Criteria and Hazardous Pollutants."[64]

1. Obtain activity data. Acres burned data at the state-level is available from the following sources: a) U.S. Department of Interior, Bureau of Land Management (DOI BLM); b) the National Park Service (NPS); c) the U.S. Fish and Wildlife Service (FWS); and d) U.S. Forestry Service (USFS). DOI's Bureau of Indian Affairs (BIA) and state/private land (S&P), regional-level acres burned data were obtained from the National Interagency Coordinating Committee (NICC) end-of-year Incident Management Report (27-Dec-2002). The BIA data were allocated to the state-level by determining the NICC region for each state with tribal land and then developing a region-to-state proportion using the number of acres of tribal land in each state. The state/private land activity data were allocated to the state-level using land cover type acreage for the rural forest category plus the acreage for brush and grass in the miscellaneous category. The land cover acreage was obtained from Version 2 of the Biogenic Emissions Landcover Database (BELD2) within Biogenic Emissions Inventory System (BEIS). NICC regions were matched to USFS regions, and factors were then developed to allocate the data to the State-level. The region-to-state allocation factors were developed from data in BELD2. Note that to calculate the region-to state proportions, BELD2 data for California were replaced with that from the 1996 National Toxics Inventory

[64] EPA, File: 2002prelimneinonpoint_032004.pdf, pages A-64 to A-69.

(NTI), since the USFS's Region 5 contains both Hawaii and California. Table 5.9.3-A shows the state-level number of prescribed acres burned by land ownership category.

Table 5.9.3-A. 2002 Activity Data for Prescribed Burning by State: Number of Acres Burned by Land Ownership Category

State	BLM	FWS	NPS	BIA	USFS	S & P	Total
Maine	0.0	267.1	0.0	368.2	24.0	6,958.8	7,618.1

2. Allocate the activity to the county-level. This was accomplished using acreage data for the rural forest category plus the acreage for brush and grass in the miscellaneous category, which were obtained from BELD2, Version 2. Activity data from all agencies were totaled by state and allocated to the county-level with the BELD2 factors. Because BELD2 does not contain land cover data for Alaska and Hawaii, state-to-county factors were derived from data contained in the allocation factor file used for the 1996 NTI for these two States.

3. Calculate emissions activity throughput. Emissions activity throughput is calculated by multiplying (see Equation 5.9.3-2) the acres data from step 2 by the applicable state-average fuel consumption factor (i.e., the amount actually consumed in the fire). Emissions activity includes a conversion factor of 0.0005 ton/lb and are reported in ton /lb (so the final emissions are in tons). The fuel consumption factor for Alaska was derived from AP-42 and the NTI methodologies for wildfires and prescribed fires. The NTI assumes a fuel loading of 10.4 tons/acre for wildfires, and assumes a fuel loading of 8.2 tons/acre for prescribed fires. Thus, the prescribed fire fuel loading factor for Alaska is the result of multiplying the AP-42 wildfires fuel loading factor (16) by the ratio of 8.2/10.4. The fuel consumption factor for California was used for Hawaii, since they are in the same USFS region. Table 5.9.3-B shows the state-average fuel consumption factors that were used.

Table 5.9.3-B. Prescribed Burning Fuel Consumption Factors, Smoldering Augmentation Factors and Piled Fuel Fractions

State or County	Fuel Consumption Factor (tons/acre)	State-Average Smoldering Augmentation Factor	Piled Fuel	Fraction Reference
Maine	11.0	0.085		Reference 1

4. Estimate emissions. Emissions are estimated by multiplying (see Equation 5.9.3-2) the county-level emissions activity throughput from step 3 by emission factors. Criteria pollutant emission factors were calculated using prescribed burning pile and non-pile emission factors (see Table 5.9.3-C and Equation 5.9.3-1). Criteria pollutants and seventeen dioxin and furan congener emission factors were augmented by the state-average smoldering factors shown in Table 5.9.3-B. The smoldering augmentation factor for California was used for Hawaii, since they are in the same USFS region. Twenty-nine other HAP emission factors developed from the 1996 NTI methodology for wildfires were not augmented because these factors were developed based on a weighted average that already accounts for smoldering (75% of the flaming fuel type emission factor and 25% of the smoldering fuel type emission factor). Table 5.9.3-C and Table 5.9.3-D show the emission factors and national emissions summary for criteria pollutants and HAPs, respectively.

Table 5.9.3-C. National Criteria Pollutant Emissions Summary for Prescribed Burning

Pollutant	Pile Emission Factor (lb/ton)	Non-pile Emission Factor (lb/ton)	Emission Factor Reference	2002 National Emissions (ton/year)

CO	74.3	289.0	Reference 1	2.67E+06
NH_3	0.5	1.3	Reference 1	1.21E+04
NO_x	6.2	6.2	Reference 1	6.10E+04
PM10-PRI	8.0	28.1	Reference 1	2.60E+05
PM25-PRI	8.0	24.1	Reference 1	2.24E+05
SO_2	1.7	1.7	Reference 1	1.67E+04
VOC	6.3	13.6	Reference 1	1.28E+05

Table 5.9.3-D. National HAP Pollutant Emissions Summary for Prescribed Burning

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Emissions (ton/year)
1,2,3,4,6,7,8-HpCDD	3.33E-07	Reference 5	3.27E-03
1,2,3,4,6,7,8-HpCDF	5.08E-08	Reference 5	4.99E-04
1,2,3,4,7,8,9-HpCDF	6.12E-09	Reference 5	6.02E-05
1,2,3,4,7,8-HxCDD	1.14E-08	Reference 5	1.12E-04
1,2,3,4,7,8-HxCDF	3.34E-08	Reference 5	3.29E-04
1,2,3,6,7,8-HxCDD	2.14E-08	Reference 5	2.10E-04
1,2,3,6,7,8-HxCDF	1.43E-08	Reference 5	1.40E-04
1,2,3,7,8,9-HxCDD	3.47E-08	Reference 5	3.41E-04
1,2,3,7,8,9-HxCDF	2.23E-09	Reference 5	2.19E-05
1,2,3,7,8-PeCDD	7.66E-09	Reference 5	7.53E-05
1,2,3,7,8-PeCDF	1.27E-08	Reference 5	1.25E-04
2,3,4,6,7,8-HxCDF	1.96E-08	Reference 5	1.93E-04
2,3,4,7,8-PeCDF	2.02E-08	Reference 5	1.99E-04
2,3,7,8-TCDD	2.30E-09	Reference 5	2.26E-05
2,3,7,8-TCDF	1.40E-08	Reference 5	1.37E-04
OCDD	1.33E-06	Reference 5	1.31E-02
OCDF	2.05E-08	Reference 5	2.02E-04
1,3-butadiene	4.05E-01	Reference 6	3.72E+03
1-methylpyrene	9.05E-03	Reference 6	8.31E+01
acetaldehyde	4.08E-01	Reference 6	3.75E+03
acrolein	4.24E-01	Reference 6	3.90E+03
anthracene	5.00E-03	Reference 6	4.59E+01
Benz(a)anthracene	6.20E-03	Reference 6	5.70E+01
benzene	1.13E+00	Reference 6	1.03E+04
benzo(a)fluoranthene	2.60E-03	Reference 6	2.39E+01
benzo(a)phenanthrene	3.90E-03	Reference 6	3.58E+01
benzo(a)pyrene	1.48E-03	Reference 6	1.36E+01
benzo(e)pyrene	2.66E-03	Reference 6	2.44E+01
benzo(ghi)perylene	5.08E-03	Reference 6	4.67E+01
benzo(k)fluoranthene	2.60E-03	Reference 6	2.39E+01
benzofluoranthenes	5.14E-03	Reference 6	4.72E+01
carbonyl sulfide	5.34E-04	Reference 6	4.91E+00
chrysene	6.20E-03	Reference 6	5.70E+01
fluoranthene	6.73E-03	Reference 6	6.18E+01
formaldehyde	2.58E+00	Reference 6	2.37E+04
hexane	1.64E-02	Reference 6	1.51E+02
indeno(1,2,3-cd)pyrene	3.41E-03	Reference 6	3.13E+01

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Emissions (ton/year)
methyl chloride	1.28E-01	Reference 6	1.18E+03
methylanthracene	8.23E-03	Reference 6	7.56E+01
methylbenzopyrenes	2.96E-03	Reference 6	2.72E+01
methylchrysene	7.90E-03	Reference 6	7.26E+01
o,m,p-xylene	2.42E-01	Reference 6	2.22E+03
perylene	8.56E-04	Reference 6	7.86E+00
phenanthrene	5.00E-03	Reference 6	4.59E+01
pyrene	9.29E-03	Reference 6	8.53E+01
toluene	5.68E-01	Reference 6	5.22E+03

Equations 5.9.3-1 and 5.9.3-2 display the emission estimation calculations described in steps 3 and 4 above.

$$\text{State-level average prescribed fire emission factor} = \text{Pile fraction} \times \text{Pile emission factor} + (1\text{-Pile fraction}) \times \text{Non-pile emission factor} \quad \text{(Eq. 5.9.3-1)}$$

$$\text{State-level prescribed fire emissions} = \text{Prescribed fire acres burned} \times \text{State-level average prescribed fire emission factor} \times \text{State-level prescribed fire fuel consumption} \times (1+\text{State-level smoldering augmentation factor}) \quad \text{(Eq. 5.9.3-2)}$$

Shortcomings and Areas of Improvement

The Maine DEP should review the loading factors because they appear to be high. In addition, the Maine DEP should gather activity data from the Maine Department of Agriculture.

References

1. EC/R, Incorporated, "Data Needs and Availability for Wildland Fire Emissions Inventories - Short-term Improvements to the Wildland Fire Component of the National Emissions Inventory," prepared for the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Emission Factor and Inventory Group, Emissions, Monitoring and Analysis Division. June 2003.

2. U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, AP-42, 5th Edition," October 1996. Personal communication via e-mail from Tom Bachman, North Dakota Department of Health, Division of Air Quality to Roy Huntley, EPA/EIG. E-mail dated February 24, 2003.

3. Personal communication via e-mail from Laurel Driver, EPA/EIG to Roy Huntley, EPA/EIG. E-mail dated June 6, 2003.

4. Gullet, B.K. and T. Abderrahmne, "PCDD/F Emissions from Forest Fire Simulations," *Atmospheric Environment*, Vol. 37, No. 6, pp. 803-813. February 2003.

5. U.S. Environmental Protection Agency, "Documentation for the 1996 Base Year National Toxics Inventory for Area Sources", Office of Air Quality and Planning Standards, Emissions Monitoring and Analysis Division, Emission Factor and Inventory Group, 2001.

5.9.4 Open Burning: Prescribed Forest Land Fires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine has updated emission estimates for Open Burning: Prescribed Forest Land Fires (SCC: 2810015000) for 2002.

Maine 2002 Methodology

Maine DEP calculated emissions from prescribed burning of forest land for 2002 based on activity data obtained from the Maine Forest Service. In 2002, the only activity data for this category was the burning of fifteen acres of Red-Pine undergrowth at the Moose Horn National Wildlife Refuge in Washington County. Maine applied a loading rate of 4.7 tons per acre, based upon the loading rate assigned to Pine-grass Savanana in the December, 2002 WGA/WRAP forest fire improvement report.[65] The Maine DEP applied emission factors for wild forest fires (see Table 5.9.1-D: Emission factors used in wildfire emission estimates on page 121), using the following formula:

Emissions = Acres Burned x loading factor x emission factor

Where:

Emissions	= The estimated emission from this source category by pollutant and fire type
Acres Burned	= The number of acres burned in wildfire, by type of habitat
Loading Factor	= The tons of fuel consumed per acre by fire in each habitat type
Emissions Factor	= The lbs of pollutant release for each ton of fuel burned in a wildfire

5.9.5 Open Burning: Prescribed Grassland and Brush (Rangeland) Fires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine has updated emission estimates for Open Burning: Prescribed Grassland and Brush Fires (SCC: 2810020000) for 2002.

Maine 2002 Methodology

Prescribed burning of grassland and brush did not fit well into an existing SCC, so Maine ascribed it to the SCC for prescribed burning of rangeland (SCC: 2810020000). The 2002 activity data is based on information from the Maine Forest Service, and the following information in:

[65] 4.7 tons fuel per acre burned value in Table 3.2: Summary of Fuel loading and Consumption by NRDFS Model for Wildfires in Draft Final Report 1996 Fire Emission Inventory for WGA/WRAP, Dec 2002.

Table 5.9.5-A: 2002 Prescribed Grass and Brush Fire Activity Data for Maine

Fire Name	County	Acres	fuel type	Reference
Bull Brook	Oxford	12	Grass or brush	1
Roost	Oxford	7	Grass or brush	1
Nature Conservancy	York	125	Grass & Shrubs	2
Moosehorn NWR	Washington	15	Marsh	3
Moosehorn NWR	Washington	9	Grasslands	3
Moosehorn NWR	Washington	7	Grassland/marsh	3

Maine applied a loading rate of 4.5 tons of fuel consumed per acre burned, based upon the loading rate assigned to Sagebrush-grass in the December, 2002 WGA/WRAP forest fire improvement report.[66] The Maine DEP applied emission factors for wild forest fires (see Table 5.9.1-D: Emission factors used in wildfire emission estimates on page 121), using the following formula:

Emissions = Acres Burned x loading factor x emission factor

Where:

Emissions	= The estimated emission from this source category by pollutant and fire type
Acres Burned	= The number of acres burned in wildfire, by type of habitat
Loading Factor	= The tons of fuel consumed per acre by fire in each habitat type
Emissions Factor	= The lbs of pollutant release for each ton of fuel burned in a wildfire

References

1. **E-Mail From**: Erin D Small, Fire Planner White/ Green Mountain National Forests 719 Main Street Laconia, NH 03246 Phone: (603) 528-9501 Fax: (603) 528-8783 [mailto:esmall@fs.fed.us] **Sent:** Monday, September 20, 2004 3:56 PM **To:** Saball, Doug; **Cc**: Wright, David W; Gould, Tammy **Subject:** RE: fire info.

2. September 28, 2004 telephone conversation between Doug Saball, Maine DEP-BAQ, and Parker Schuerman in the Portland office of the Nature Conservancy at 207-646-1788.

3. **E-Mail From:** Maurice Mills Jr., Wildlife Biologist; USFWS, Moosehorn National Wildlife Refuge; RR 1 Box 202 Suite 1; Baring, ME 04694; 207/454-7161; FAX: 207/454-2550 [mailto:Maurice_Mills@fws.gov] ; **Sent:** Tuesday, September 21, 2004 3:14 PM; **To:** Doug.Saball@maine.gov; **Subject:** Moosehorn NWR Prescribed and Wildland Fire - 1999 & 2002.

[66] 4.5 tons fuel per acre burned from Sagebrush-grass value in Table 3.2: Summary of Fuel loading and Consumption by NRDFS Model for Wildfires in Draft Final Report 1996 Fire Emission Inventory for WGA/WRAP, Dec 2002

5.9.6 Open Burning: Prescribed Burning of Land Clearing Debris

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is accepting EPA's approach for estimate emissions from Open Burning: Prescribed Burning of Land Clearing Debris (SCC: 2610000500) for 2002.

EPA 2002 Methodology

Maine is accepting the 2002 NEI emissions estimates for Open Burning: Land Clearing Debris as presented in the preliminary NEI documentation.[67] Relevant portions of the methodology are quoted below.

Criteria pollutant and HAP emission estimates for land clearing debris burning are a function of the amount of material or fuel subject to burning per year. The amount of material burned was estimated using the county-level total number of acres disturbed by residential, non-residential, and road construction. County-level weighted loading factors were applied to the total number of construction acres to convert acres to tons of available fuel.

Version 2 of the Biogenic Emissions Land cover Database (BELD2) within EPA's Biogenic Emission Inventory System (BEIS) was used to identify the acres of hardwoods, softwoods, and grasses in each county. Table 5.9.6-A presents the average fuel loading factors by vegetation type. The average loading factors for slash hardwood and slash softwood were adjusted by a factor of 1.5 to account for the mass of tree that is below the soil surface that would be subject to burning once the land is cleared.[1] Weighted average county-level loading factors were calculated by multiplying the average loading factors by the percent contribution of each type of vegetation class to the total land area for each county.

Table 5.9.6-A: Fuel Loading Factors by Vegetation Type

Vegetation Type	Unadjusted Average Fuel Loading Factor (Ton/acre)	Adjusted Average Fuel Loading Factor (Ton/acre)
Hardwood	66	99
Softwood	38	57
Grass	4.5	Not applicable

Controls for land clearing debris burning are generally in the form of a ban on open burning of waste in a given municipality or county. Counties that were more than 80% urban were assumed not to practice any open burning. Appendix B contains the counties with a population more than 80% urban. Therefore, criteria pollutant and HAP emissions from yard waste burning are zero in these counties. In addition, the State of Colorado implemented a state-wide ban on open burning. Emissions from open burning of land clearing debris in all Colorado counties were assumed to be zero.

County-level criteria pollutant and HAP emissions (in lb/year) were calculated by multiplying the total mass of land clearing debris burned per year by an emission factor.[1,2,3] Emissions were then converted to ton/year by dividing the emissions by 1 ton/2000 lb. Forest fire simulation emission factors were used to estimate emissions for 17 Dioxin congeners.[4] The Dioxin emission factors were multiplied by 0.002 to convert from mg/kg to lb/ton. Table 5.9.6-B contains the emissions factors, total mass of land clearing debris burned and national criteria pollutants and HAP emissions from burning of land clearing debris.

[67] EPA, Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (March 2004 Version).

Table 5.9.6-B: National Emission Summary for Open Burning of Land Clearing Debris

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Activity Level (tons burned/year)	2002 National Emissions (tons/year)
VOC	1.16E+01	Reference 1	1.35E+07	7.81E+04
NOX	5.00E+00	Reference 2	1.35E+07	3.37E+04
CO	1.69E+02	Reference 1	1.35E+07	1.14E+06
PM10-FIL	1.70E+01	Reference 1	1.35E+07	1.14E+05
PM25-FIL	1.70E+01	Reference 1	1.35E+07	1.14E+05
PM10-PRI	1.70E+01	Reference 1	1.35E+07	1.14E+05
PM25-PRI	1.70E+01	Reference 1	1.35E+07	1.14E+05
1,2,3,4,6,7,8-HpCDD	3.33E-07	Reference 4	1.35E+07	2.24E-03
1,2,3,4,6,7,8-HpCDF	5.08E-08	Reference 4	1.35E+07	3.42E-04
1,2,3,4,7,8,9-HpCDF	6.12E-09	Reference 4	1.35E+07	4.11E-05
1,2,3,4,7,8-HxCDD	1.14E-08	Reference 4	1.35E+07	7.64E-05
1,2,3,4,7,8-HxCDF	3.34E-08	Reference 4	1.35E+07	2.25E-04
1,2,3,6,7,8-HxCDD	2.14E-08	Reference 4	1.35E+07	1.44E-04
1,2,3,6,7,8-HxCDF	1.43E-08	Reference 4	1.35E+07	9.60E-05
1,2,3,7,8,9-HxCDD	3.47E-08	Reference 4	1.35E+07	2.34E-04
1,2,3,7,8,9-HxCDF	2.23E-09	Reference 4	1.35E+07	1.49E-05
1,2,3,7,8-PeCDD	7.66E-09	Reference 4	1.35E+07	5.15E-05
1,2,3,7,8-PeCDF	1.27E-08	Reference 4	1.35E+07	8.53E-05
2,3,4,6,7,8-HxCDF	1.96E-08	Reference 4	1.35E+07	1.32E-04
2,3,4,7,8-PeCDF	2.02E-08	Reference 4	1.35E+07	1.36E-04
2,3,7,8-TCDD	2.30E-09	Reference 4	1.35E+07	1.54E-05
2,3,7,8-TCDF	1.40E-08	Reference 4	1.35E+07	9.39E-05
Cumene	1.33E-02	Reference 3	1.35E+07	8.92E+01
Dibenzofuran	6.75E-03	Reference 3	1.35E+07	4.55E+01
Ethyl Benzene	4.80E-02	Reference 3	1.35E+07	3.23E+02
Methyl Ethyl Ketone	6.70E-02	Reference 3	1.35E+07	4.51E+02
OCDD	1.33E-06	Reference 4	1.35E+07	8.94E-03
OCDF	2.05E-08	Reference 4	1.35E+07	1.38E-04
Phenol	1.15E-01	Reference 3	1.35E+07	7.75E+02
Styrene	1.02E-01	Reference 3	1.35E+07	6.84E+02

Areas for Improvement

This is likely to be a small emission source category. However, the emissions are likely to be over estimated given the state's propensity to chip wood and use the chips, rather than burn slash. The amount of wood burned for road-construction must be near zero, as would the amount burned for commercial construction. Even a small percentage of the total debris cleared for residential construction will be burned in Maine. Additionally, the loading rates appear high, particularly the factor used to account for stumps, which are almost never burned no matter what the clearing sector, simply because stumps and roots are difficult to burn. This overestimation should be investigated in instances where emissions from this sector play a significant role in making a policy decision.

References

1. Ward, D.E., C.C. Hardy, D.V. Sandberg, and T.E. Reinhardt. "Mitigation of Prescribed Fire Atmospheric Pollution Through Increased Utilization of Hardwoods, Piled Residues, and Long-Needled Conifers." Final Report. USDA Forest Service, Pacific Northwest Research Station, Fire and Air Resource Management. 1989.

2. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 13.1 Prescribed Burning,, Table 13.1.3 October 1992.

3. U.S. Environmental Protection Agency, *Evaluation of Emissions from the Open Burning of Household Waste in Barrels*, EPA-600/R-97-134a, Control Technology Center. November 1997.

4. Gullet, B.K. and T. Abderrahmne, "PCDD/F Emissions from Forest Fire Simulations," *Atmospheric Environment*, Vol. 37, No. 6, pp. 803-813. February 2003.

5.9.7 Open Burning: Prescribed Slash Fires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

In consultation with the Maine Forest Service, Maine DEP has determined that the activity data for Prescribed Slash Fires (SCC: 2810005000) is near zero. Therefore, Maine corrected EPA's 2002 preliminary NEI emissions for this category to zero.

The Maine Forest Services informed Maine DEP that almost all slash is chipped. These chips are used primarily as a fuel in biomass boilers. These emissions are captured in the point source inventory. A smaller volume of chips are land applied, used as a mulching agent, or in composting operations.

Areas for Improvement

Maine needs better activity data for this source category. Maine DEP should explore the use of "burn-permit" data, as discussed at the end of section 5.9.9 below.

5.9.8 Open Burning: Residential Household Waste

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine DEP updated the 2002 NEI emission estimates for Open Burning: Residential Household Waste (SCC: 2610030000) as presented below. These revisions are in accordance with stakeholder comments received by Maine DEP during the inventory process for the Maine Air Toxics Initiative.

Methodology

In 1997, the Maine Department of Conservation, Forestry Bureau surveyed town fire wardens and state forest fire rangers about the degree of backyard burning[68] in each town and in groups of townships in the

[68] MAINE DEP, *State of Maine 1997 Backyard Trash Burning (BYB) Study,* and *State of Maine 1997 Backyard Trash Burning (BYB) Study, Technical Support Documents. (*Maine Department of Environmental Protection, 17 SHS, Augusta, ME 04333-0017).

state. The survey estimated that 7,665 tons of waste was burned in approximately 8,510 backyard trash incinerators throughout the State of Maine in 1997. Based on this information, and the amount of dioxin released by this activity, the Maine legislature banned the burning of household trash by amending 12 M.R.S.A., Section 9301 and sections 9321 through 9325, effective in the fall of 2001.[69] Prior to that, to use a burn barrel, a person had to obtain a burn permit from the local fire warden. In 2002, wardens did not issue permits for burn barrels used to combust MSW, since the legislature had banned the practice.

With this in mind, Maine DEP used the 1997 baseline of municipal solid waste (MSW) combusted, and grew out this volume to 2002 levels, based on population growth in each county. Then Maine DEP applied a rule effectiveness of 80%; that is, Maine DEP assumed 20% of the 2002 potential solid waste volume that would have been burned without the ban was still be burned. The volume of MSW burned was apportioned to each county, based on the number of burn barrels in each county found in the 1997 survey. Emission factors from *EPA's preliminary NEI development document*[70] were applied to the total waste tonnage to estimate emissions of pollutants.

Equations

1997 Barrels/1997 Population **x** 2002 Population = 2002 Barrels
1997 Tonnage/1997 Barrels **x** 2002 Barrels = 2002 Potential Tonnage (without a burn ban)
2002 Potential Tonnage **x** 0.20 = 2002 Actual Tonnage (considering the burn ban)
2002 Actual Tonnage **x** Emission Factor (pounds of pollutant/ ton MSW burned) = Emissions (pounds of pollutant)

Table 5.9.8-A. Emission Factors for Open Burning of Residential Household Waste

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference
CO	8.50E+01	Reference 3
NOX	6.00E+00	Reference 3
PM10-FIL	3.80E+01	Reference 4
PM10-PRI	3.80E+01	Reference 4
PM25-FIL	3.48E+01	Reference 4
PM25-PRI	3.48E+01	Reference 4
SO2	1.00E+00	Reference 3
VOC	3.00E+01	Reference 3
1,2,3,4,6,7,8-heptachlorodibenzofuran	2.48E-07	Reference 5
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	7.96E-08	Reference 5
1,2,3,4,7,8,9-heptachlorodibenzofuran	3.00E-08	Reference 5
1,2,3,4,7,8-hexachlorodibenzofuran	2.28E-07	Reference 5
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	1.28E-08	Reference 5
1,2,3,6,7,8-hexachlorodibenzofuran	7.70E-08	Reference 5
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	1.94E-08	Reference 5
1,2,3,7,8,9-hexachlorodibenzofuran	5.00E-09	Reference 5
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	3.80E-08	Reference 5
1,2,3,7,8-pentachlorodibenzofuran	7.44E-08	Reference 5
1,2,3,7,8-pentachlorodibenzo-p-dioxin	1.62E-08	Reference 5

[69] This was followed by the Department Amending Chapter 102, "Open Burning", effective January 14, 2003, to correspond to the new legislation. Since the legislation controlled the rule, open burning of Municipal Solid Waste (other than clean wood waste such as brush and leaves) was effectively banned during the 2002 calendar year.
[70] USEPA March 2004 Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 version), Appendix A: Open Burning - Residential Household Waste, SCC: 2610030000.

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference
1,2,4-trichlorobenzene	2.20E-04	Reference 4
1,4-dichlorobenzene	3.20E-04	Reference 4
2,3,4,6,7,8-hexachlorodibenzofuran	1.24E-07	Reference 5
2,3,4,7,8-pentachlorodibenzofuran	1.30E-07	Reference 5
2,3,7,8-tetrachlorodibenzofuran	9.12E-08	Reference 5
2,3,7,8-tetrachlorodibenzo-p-dioxin	5.40E-09	Reference 5
Acenaphthene	1.54E-03	Reference 4
Acenaphthylene	2.26E-02	Reference 4
Anthracene	3.66E-03	Reference 4
Benz[a]anthracene	4.48E-03	Reference 4
Benzene	2.48E+00	Reference 4
Benzo[a]pyrene	4.24E-03	Reference 4
Benzo[b]fluoranthene	5.26E-03	Reference 4
Benzo[g,h,i,]Perylene	3.95E-03	Reference 4
Benzo[k]fluoranthene	2.05E-03	Reference 4
Chlorobenzene	8.48E-04	Reference 4
Chrysene	5.07E-03	Reference 4
Dibenzo[a,h]anthracene	6.46E-04	Reference 4
Fluoranthene	8.14E-03	Reference 4
Fluorene	7.31E-03	Reference 4
Hexachlorobenzene	4.40E-05	Reference 4
Hydrochloric Acid	5.68E-01	Reference 4
Hydrogen Cyanide	9.36E-01	Reference 4
Indeno[1,2,3-c,d]pyrene	3.75E-03	Reference 4
Naphthalene	3.51E-02	Reference 4
Octachlorodibenzofuran	7.28E-08	Reference 5
Octachlorodibenzo-p-dioxin	9.94E-08	Reference 5
Pentachlorophenol	1.06E-04	Reference 4
Phenanthrene	1.46E-02	Reference 4
Phenol	2.80E-01	Reference 4
Polychlorinated Biphenyls	5.72E-03	Reference 4
Pyrene	9.66E-03	Reference 4
Styrene	1.48E+00	Reference 4

<u>References</u>

1. United States Environmental Protection Agency, Office of Air Quality Planning and Standards. *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 2.5 Open Burning*. Research Triangle Park, NC. October 1992.

2. U.S. Environmental Protection Agency, Control Technology Center. "Evaluation of Emissions from the Open Burning of Household Waste in Barrels." EPA-600/R-97-134a. November 1997.

3. United States Environmental Protection Agency, Office Of Research And Development. Exposure And Human Health Reassessment Of 2,3,7,8-Tetrachlorodibenzeno-P-Dioxin (TCCD) And Related Compounds. Part I: Estimating Exposure To Dioxin-Like Compounds. Volume 2: Sources Of Dioxin-Like Compounds In The United States. EPA/600/P-00/001AB. Washington D.C. March 2001.

5.9.9 Open Burning: Residential Yard Waste: Leaf and Brush Species

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is accepting the 2002 NEI emission estimates for Open Burning: Residential Yard Waste: Leaf And Brush Species (SCC: 2610000100 & 2610000400) as presented in the preliminary NEI documentation[71] and is quoted below.

Methodology

Criteria pollutant and HAP emission estimates for leaf and brush waste burning are a function of the amount of waste burned per year. The amount of leaf and brush waste burned was estimated using data from EPA's report *Municipal Solid Waste in the United States(1).* The report presents the total mass of waste generated in the United States by type of waste, including yard waste, for the calendar year 2000. This information was used to calculate a daily estimate of the per capita yard waste, 0.54 lbs/person/day. Of the total amount of yard waste generated, the yard waste composition was assumed to be 25 percent leaves, 25 percent brush, and 50 percent grass by weight.(2) Open burning of grass clippings is not typically practiced by homeowners, and as such only estimates for leaf burning and brush burning were developed. Approximately 25 to 32 percent of all waste is actually burned.(2) It was assumed that 28 percent of the leaf and brush yard waste generated is burned.

The per capita estimate was then multiplied by the 2002 population in each county that is expected to burn waste. Since open burning is generally not practiced in urban areas, only the rural population of each county was assumed to practice open burning. The ratio of urban to rural population was obtained from 2000 U.S. Census data.(7) This ratio was then multiplied by the 2002 U.S. Census Bureau estimate of the population in each county to obtain the county-level rural population for 2002 6. Appendix B [of the Preliminary NEI Documentation] contains both the total population and urban and rural population data in database format.

The percentage of forested acres from Version 2 of BELD2 within BEIS was used to adjust for variations in vegetation. The percentage of forested acres per county (including rural forest and urban forest) was then determined. To better account for the native vegetation that would likely be occurring in the residential yards of farming States, agricultural land acreage was subtracted before calculating the percentage of forested acres. Table 5.9.9-A presents the ranges that were used to make adjustments to the amount of yard waste that is assumed to be generated per county.

Table 5.9.9-A. Adjustment for Percentage of Forested Acres

Percent Forested Acres per County	Adjustment for Yard Waste Generated
< 10%	0% generated
>= 10%, and < 50%	50% generated
>= 50%	100% generated

Controls for yard waste burning are generally in the form of a ban on open burning of waste in a given municipality or county. Counties that were more than 80% urban were assumed not to practice any open burning. Therefore, CAP and HAP emissions from residential municipal solid waste burning are zero in these counties.

County-level criteria pollutant and HAP emissions were calculated by multiplying the total amount of yard waste (leaf and brush) burned per year by an emission factor(3,4). Emissions for leaves and residential brush were calculated separately, since emission factors vary by yard waste type. Forest fire simulation emission factors were used to estimate emissions for 17 Dioxin congeners(5). Tons of debris burned

[71] EPA, Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version. File: 2002prelimneinonpt_032004.pdf, pages A-76, A-77.

were converted to kilograms (kg) by multiplying by 907.18474. Tables 5.9.9-B and 5.9.9-C contain the emissions factors, total mass of yard waste burned and national criteria pollutants and HAP emissions from burning of leaves and brush, respectively.

Sample Calculation

2000 Leaf Burning activity, kg/year = 2.55E+08

2000 Leaf Burning 2,3,7,8-TCDD emissions, mg/year = 2.55E+08 * 1.15E-06 = 2.93E+02

Table 2. National Emissions Summary for Leaf Species (SCC 2610000100)

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Activity Level (tons burned/year)	2002 National Emissions (tons/year)
CO	1.12E+02	Reference 4	2.87E+05	1.59E+04
PM10-FIL	3.80E+01	Reference 4	2.87E+05	5.41E+03
PM10-PRI	3.80E+01	Reference 5	2.87E+05	5.41E+03
PM25-FIL	3.80E+01	Reference 5	2.87E+05	5.41E+03
PM25-PRI	3.80E+01	Reference 4	2.87E+05	5.41E+03
VOC	2.80E+01	Reference 4	2.87E+05	3.99E+03
Ethyl Benzene	4.80E-02	Reference 3	2.87E+05	6.83E+00
Styrene	1.02E-01	Reference 3	2.87E+05	1.44E+01
Phenol	1.15E-01	Reference 3	2.87E+05	1.64E+01
2,3,7,8-tetrachlorodibenzo-p-dioxin	2.30E-09	Reference 3	2.87E+05	3.27E-07
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	3.46E-08	Reference 3	2.87E+05	4.92E-06
Octachlorodibenzo-p-dioxin	1.33E-06	Reference 3	2.87E+05	1.89E-04
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	3.32E-07	Reference 5	2.87E+05	4.73E-05
Octachlorodibenzofuran	2.06E-08	Reference 5	2.87E+05	2.93E-06
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	1.14E-08	Reference 5	2.87E+05	1.62E-06
1,2,3,7,8-pentachlorodibenzo-p-dioxin	7.66E-09	Reference 5	2.87E+05	1.09E-06
2,3,7,8-tetrachlorodibenzofuran	1.40E-08	Reference 5	2.87E+05	1.99E-06
1,2,3,4,7,8,9-heptachlorodibenzofuran	6.12E-09	Reference 5	2.87E+05	8.71E-07
2,3,4,7,8-pentachlorodibenzofuran	2.02E-08	Reference 5	2.87E+05	2.87E-06
1,2,3,7,8-pentachlorodibenzofuran	1.27E-06	Reference 5	2.87E+05	1.80E-04
1,2,3,6,7,8-hexachlorodibenzofuran	1.43E-08	Reference 5	2.87E+05	2.03E-06
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	2.14E-08	Reference 5	2.87E+05	3.05E-06
2,3,4,6,7,8-hexachlorodibenzofuran	1.96E-08	Reference 5	2.87E+05	2.79E-06
1,2,3,4,6,7,8-heptachlorodibenzofuran	5.08E-08	Reference 5	2.87E+05	7.23E-06
1,2,3,4,7,8-hexachlorodibenzofuran	3.34E-08	Reference 5	2.87E+05	4.75E-06
1,2,3,7,8,9-hexachlorodibenzofuran	2.22E-09	Reference 5	2.87E+05	3.16E-07
Methyl Ethyl Ketone	6.70E-02	Reference 5	2.87E+05	9.54E+00
Cumene	1.33E-02	Reference 4	2.87E+05	1.89E+00

Table 3. National Emissions Summary for Brush Species (SCC 2610000400)

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Activity Level (tons burned/year)	2002 National Emissions (tons/year)
CO	1.40E+02	Reference 5	2.87E+05	1.99E+04
PM10-PRI	1.70E+01	Reference 4	2.87E+05	2.42E+03
PM10-FIL	1.70E+01	Reference 4	2.87E+05	2.42E+03
PM25-PRI	1.70E+01	Reference 5	2.87E+05	2.42E+03
PM25-FIL	1.70E+01	Reference 5	2.87E+05	2.42E+03
VOC	1.90E+01	Reference 4	2.87E+05	2.70E+03
1,2,3,4,6,7,8-heptachlorodibenzofuran	5.08E-08	Reference 3	2.87E+05	7.23E-06
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	3.32E-07	Reference 3	2.87E+05	4.73E-05
1,2,3,4,7,8,9-heptachlorodibenzofuran	6.12E-09	Reference 3	2.87E+05	8.71E-07
1,2,3,4,7,8-hexachlorodibenzofuran	3.34E-08	Reference 3	2.87E+05	4.75E-06

Pollutant	Emission Factor (lb/ton)	Emission Factor Reference	2002 National Activity Level (tons burned/year)	2002 National Emissions (tons/year)
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	1.14E-08	Reference 3	2.87E+05	1.62E-06
1,2,3,6,7,8-hexachlorodibenzofuran	1.43E-08	Reference 3	2.87E+05	2.03E-06
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	2.14E-08	Reference 5	2.87E+05	3.05E-06
1,2,3,7,8,9-hexachlorodibenzofuran	2.22E-09	Reference 5	2.87E+05	3.16E-07
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	3.46E-08	Reference 5	2.87E+05	4.92E-06
1,2,3,7,8-pentachlorodibenzofuran	1.27E-06	Reference 5	2.87E+05	1.80E-04
1,2,3,7,8-pentachlorodibenzo-p-dioxin	7.66E-09	Reference 5	2.87E+05	1.09E-06
2,3,4,6,7,8-hexachlorodibenzofuran	1.96E-08	Reference 5	2.87E+05	2.79E-06
2,3,4,7,8-pentachlorodibenzofuran	2.02E-08	Reference 5	2.87E+05	2.87E-06
2,3,7,8-tetrachlorodibenzofuran	1.40E-08	Reference 5	2.87E+05	1.99E-06
2,3,7,8-tetrachlorodibenzo-p-dioxin	2.30E-09	Reference 5	2.87E+05	3.27E-07
Cumene	1.33E-02	Reference 5	2.87E+05	1.89E+00
Ethyl Benzene	4.80E-02	Reference 5	2.87E+05	6.83E+00
Methyl Ethyl Ketone	6.70E-02	Reference 5	2.87E+05	9.54E+00
Octachlorodibenzofuran	2.06E-08	Reference 5	2.87E+05	2.93E-06
Octachlorodibenzo-p-dioxin	1.33E-06	Reference 5	2.87E+05	1.89E-04
Phenol	1.15E-01	Reference 4	2.87E+05	1.64E+01
Styrene	1.02E-01	Reference 4	2.87E+05	1.44E+01

MANE-VU Modeling Issues

For its modeling project, MANE-VU also added to this category centralized burning that is done by municipalities. Maine DEP does not accept this addition to SCC 2610040400, because we believe that this would be double counting. EPA's estimates of Open Burning: Residential Yard Waste: Leaf and Brush were calculated on a per-capita basis, and thus should already capture centralized burning. However, if Maine DEP begins to calculate this source category based on issued burn permits (see improvement section below), then centralized burning will have to be accounted for. The Maine DEP's Solid Waste Program may have activity data for centralized burning. MANE-VU also did a survey for its region.

The Maine also notes that the MANE-VU open burning methodology tried to eliminate double counting of municipal versus residential yard waste burning. This is based on survey data extrapolated to unsurveyed areas in New England. However, for a given municipality or county, MANE-VU admits that there is the potential for double counting due to the limitations of the survey instrument.

Areas for Improvement

Maine needs better activity data for this source category. Maine DEP should explore the use of "burn-permit" data. Campfires and open burning is permitted through municipalities (fire chief, fire warden) in the organized towns and through Maine Forest Service (MFS) district offices in the Unorganized Towns. On the MFS side there are 9-12 offices that issue these permits. One such office (Bolton Hill Augusta) issues thousands in the course of a year. Organized towns are required to annually report the number they issue to the designated MFS office, and the district ranger has a good sense of the municipal number of permits issued. The MFS numbers are tracked and published in annual summaries at the region level (3 regions). If Maine DEP could determine the average weight of vegetation burned in each event. The burn permit information could be used to determine a more accurate loading rate. Maine DEP should contact Bill Williams at 287-4991, State Supervisor for the Forest Protection Division about this data.

References

1. U.S. Environmental Protection Agency, *Municipal Solid Waste in the United States: 2000 Facts and Figures,* EPA530-R-02-001, Office of Solid Waste and Emergency Response. June 2002.

2. Two Rivers Regional Council of Public Officials and Patrick Engineering, Inc. “Emission Characteristics of Burn Barrels,” prepared for the U.S. Environmental Protection Agency, Region V. June 1994.

3. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Section 2.5 Open Burning,, Tables 2.5-5 and 2.5-6. October 1992.

4. U.S. Environmental Protection Agency, *Evaluation of Emissions from the Open Burning of Household Waste in Barrels,* EPA-600/R-97-134a, Control Technology Center. November 1997.

5. Gullet, B.K. and T. Abderrahmne, “PCDD/F Emissions from Forest Fire Simulations,” *Atmospheric Environment,* Vol. 37, No. 6, pp. 803-813. February 2003.

6. U.S. Census Bureau. 7/1/2002 County Population Estimates File and Components of Change, [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php

7. U.S. Census Bureau, Decennial Censuses, 2000 Census: SF1, Table P2.

5.9.10 Open Burning: Scrap Tires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine accepts the 2002 National Emissions Inventory estimation for Open Burning: Scrap Tires (SCC: 283000000) based on the documentation of scrap tire fires in Maine for 2002.

Maine has an aggressive program to identify and clean-up scrap tire dumps. However, data from EPA’s 2002 preliminary 2002 NEI documentation did detect one tire pile fire, as follows:

Table 5.9.10-A: Summary of 2002 Tire Fires Found [in Maine]

County Location	State	Date of Fire	Number of Tires Burned	Reference
Androscoggin County	ME	June 30, 2002	2,250	12

Source for Reference 12: Associated Press (via Lexis Nexis). “Firefighters from five town bring tire dump under control,” Load date: July 1, 2002.

5.9.11 Open Burning: Structure Fires

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating this category and performing new emission estimates for Open Burning: Structure Fires (SCC: 2810030000) for the 2002 NEI.

Maine 2002 Methodology

Emissions from structure fires were estimated using data obtained from the Maine Fire Marshall's Office[72] pertaining to the number of structure fires reported by local fire departments. The information gathered by the Fire Marshall's Office includes the number of structures burned in a given town, and the number of people that the fire department serves. Maine DEP assigned each town to its respective county, and added up the total number of fires in each county. The Fire Marshall's Office's information does not include reports from every town in Maine. The report does include the number of people served by the fire stations that do report the activity data. To estimate activity data for the towns that did not report, Maine DEP apportioned fires based on the per capita average of reported fires for the county, as follows:

$$\text{Estimated actual number of structures burned} = \text{Total fires Reported} \times \text{Total Population of County} \,/\, \text{County Population served by Towns Reporting}$$

When no towns reported in a county (e.g., Lincoln), the number of structure fires was apportioned based upon the per capita average of reported structure fires for the state, as follows:

$$\text{Estimated actual number of structures burned} = \text{Total fires Reported} \times \text{Total Population of State} \,/\, \text{County Population}$$

Emission Factors

Maine DEP determined emissions for each county using the estimated total number of structures burned in each county, along with the EPA fuel loading factor of 1.15 tons of material burned per fire, and the following emission factors from EIIP Volume III, Chapter 18 January 31, 2001, page 18.4-5, Table 18.41.[73]

Table 5.9.11-A: Emission Factors for Open Burning: Structure Fires

Pollutant	Emission Factor	Units
VOC	1.10E+01	lbs./ton
NOx	1.40E+00	lbs./ton
CO	6.00E+01	lbs./ton
PM	1.08E+01	lbs./ton
TOC	1.39E+01	lbs./ton
Acrolein	4.41E+00	lbs./ton
Formaldehyde	1.02E+00	lbs./ton
Hydrogen chloride	1.51E+01	lbs./ton
Hydrogen cyanide	3.55E+01	lbs./ton

Tons = # fires x 1.15 tons Emission factor (lbs / 2000 lbs/ton

[72] Maine Fire Incident Reporting System 2002 Annual Report, Maine Fire Chiefs Association & Office of State Fire Marshal.
[73] EIIP Document Series, Volume III: Chapter 18 Structure Fires. , page 18.4-5, Table 18.41. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Revised Final, January 2001.

pollutant burned / fire * pollutant/ton burned)

In terms of determining tons of VOC generated in a typical summer day, emissions from accidental categories such as this can be assumed to be uniform throughout the year.

Sample Calculation

Cumberland County VOCs from Structure Fires

303 Fires x 1.15 Tons/Fire = 348.45 Tons

(348.45 x 11 Lbs./Ton VOC)/2000 = 1.92 Tons VOC

1.92 Tons VOC / 365 Days = 0.0053Tpswd

5.9.12 On-Site Incineration: Medical Waste Incineration

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine is carrying forward emission estimates for On-Site Incineration: Medical Waste Incineration (SCC: 2601000000) from the 1999 NEI.

Methodology

Medical waste incineration includes the burning of wastes produced by hospitals, veterinary facilities, crematoriums, and medical research facilities. In order to generate county values in 1999 for tonnage of waste burned, all hospitals, crematoriums, and medical research facilities were contacted through a telephone survey. Data obtained from crematoriums was in the form of bodies incinerated per year. In order to convert this value to mass, the number of bodies was multiplied by a statewide percentage of sex then by the average human body weight for men and for women.

Due to the large number of veterinary incinerators in-state, data was generated three different ways: (1) from the most recent license application, (2) via telephone survey, and/or (3) a facility average. In the late 1990's, the Department's air emission licensing section, began an inquiry into the actual mass burned for these types of facilities over a calendar year as part of the license renewal application. Sixteen (16) out of twenty-eight (28) facilities reported information this way, covering about 57% of the veterinary facilities in Maine. Another eight (8) facilities, encompassing about 29%, were reached via a telephone survey. The remaining four (4) facilities (amounting to about 14%) were not included as they could not be reached or estimated. Therefore, an average of 9.42 tons of animal mass per year was utilized as a surrogate estimate.

Sample Calculation

VOC Cumberland County

184.27 Tons Medical Waste x 0.299 Lbs./Ton) /2000 = 0.028 Tons VOC
0.028 Tons VOC x 0.25 /91 Days = 0.00001 tpswd VOC

Table 5.9.12-A. Solid Waste Incineration - Cumberland County
Emission Factors in lbs./ton.

Source	VOC	NOx	CO
Medical Waste	0.299	3.56	2.95

In 1999, Maine supplied numbers for VOC, NOx and CO. EPA rolled this data forward and supplemented our data with values for PM_{10}, PM $_{2.5}$, and SO_2. The growth for this category is very small through 2002 therefore the 1999 values are appropriate. The values EPA supplied seem extremely high. The emission factors above were obtained from AP-42 Chapter 2.3 – Medical Waste Incineration. Using the factors in AP-42 for PM, and SO2 yield numbers much 10 times lower then what EPA derived.

<u>Areas of Improvement</u>

1. Investigate and replace if necessary the emissions estimates of PM and SO2.

5.9.13 Open Burning: Vehicle Fires

Only a relatively small number of vehicles burn each year, so this is a minor source of CAP and HAP emissions. Therefore, Maine DEP will no longer be estimating emissions for Open Burning: Vehicle Fires (SCC: 2810050000).

5.9.14 Other Combustion: Human Perspiration and Respiration

This category, under SCC code 2810010000, was inadvertently included in the 1999 NEI for Maine. HAP emissions from forest and other wildfires represented a significant source of pollutants on a toxicity-weighted emissions basis. EPA had generated these emissions based on what Maine DEP believes were erroneously high count of forest fires in Maine, and high fuel combustion rates per acre. Maine DEP had attempted to correct these errors in the 1999 NEI, but the forest fire emissions developed by the state were mis-coded in the 1999 NEI as human perspiration and respiration. Therefore, the inventory contained not only EPA's inflated HAP emissions for wildfires, but also the correct emissions under a different category label, exacerbating the high estimates. In this 2002 NEI, Maine DEP has estimated forest fire estimates (see Section 5.9.4 above) and is requesting that EPA zero-out emissions from human perspiration and respiration.

5.10 SOLVENT USE

5.10.1 Solvent Use: Commercial and Consumer Products Usage

This source category includes the following subcategories, which are discussed in detail below.

Category	SCC
Adhesive and Sealant	2460600000
All FIFRA Related Products	2460800000
Automotive Aftermarket Products	2460400000
Coatings and Related Products	2460500000
Household Products	2460200000
Miscellaneous	2460900000
Personal Care Products	2460100000

There are seven categories within Commercial and Consumer Products Usage. **Maine accepts the methodology EPA used for all seven categories when developing the preliminary 2002 NEI. Therefore, the emission estimates attributed by EPA to Maine's counties are assumed to be correct. The following descriptions of EPA's methodology are quoted from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version."[74]**

5.10.1.1 Commercial and Consumer Products Usage: Adhesive and Sealant Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Adhesive and Sealant Products (SCC: 246060000) is one of seven categories within Commercial and Consumer Products Usage. CAP and HAP emission estimates for Adhesive and Sealant Products are assumed to be a function of the U.S. population(1). EPA developed per capita emission factors for the criteria pollutant VOC and for the 20 HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for this SCC are adjusted to reflect the promulgation of a national VOC(2) rule in 1998. The rule calls for a 20% reduction in VOC emissions for certain consumer products. Two consumer products in this SCC are affected by the rule. An adjusted VOC emission factor for this SCC is obtained from the 1999 Nonpoint Source NEI for HAPs(3). Using this method, both the VOC emission factor and HAP emission factors are reduced by 8.30%. The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau(4) estimate of the population in each County to obtain the county-level emissions. Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.1-A. 2002 National Emissions Summary for Adhesive and Sealant Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	2002 National Emissions (tons)
2-NITROPROPANE	2.12E-06	Reference 1	8.30%	1.9400E-06	292,336,314	2.8357E-01
ACRYLIC ACID	3.94E-09	Reference 1	8.30%	3.6100E-09	292,336,314	5.2767E-04
DIBENZOFURAN	8.07E-06	Reference 1	8.30%	7.4000E-06	292,336,314	1.0816E+00

[74] "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version." Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	2002 National Emissions (tons)
ETHYL BENZENE	1.36E-05	Reference 1	8.30%	1.2500E-05	292,336,314	1.8271E+00
FORMALDEHYDE	2.51E-05	Reference 1	8.30%	2.3000E-05	292,336,314	3.3619E+00
GLYCOL ETHERS	1.28E-04	Reference 1	8.30%	1.1700E-04	292,336,314	1.7102E+01
HEXANE	7.83E-02	Reference 1	8.30%	7.1800E-02	292,336,314	1.0495E+04
METHANOL	6.82E-04	Reference 1	8.30%	6.2500E-04	292,336,314	9.1355E+01
METHYL CHLOROFORM	2.14E-01	Reference 1	8.30%	1.9600E-01	292,336,314	2.8649E+04
METHYL ETHYL KETONE	3.91E-02	Reference 1	8.30%	3.5900E-02	292,336,314	5.2474E+03
METHYL ISOBUTYL KETONE	1.24E-03	Reference 1	8.30%	1.1400E-03	292,336,314	1.6663E+02
METHYLENE CHLORIDE	8.78E-03	Reference 1	8.30%	8.0500E-03	292,336,314	1.1767E+03
N,N-DIMETHYLFORMAMIDE	2.29E-07	Reference 1	8.30%	2.1000E-07	292,336,314	3.0695E-02
NAPHTHALENE	1.07E-04	Reference 1	8.30%	9.8100E-05	292,336,314	1.4339E+01
P-DIOXANE	1.09E-05	Reference 1	8.30%	1.0000E-05	292,336,314	1.4617E+00
TETRACHLOROETHYLENE	6.75E-04	Reference 1	8.30%	6.1900E-04	292,336,314	9.0478E+01
TOLUENE	8.43E-02	Reference 1	8.30%	7.7300E-02	292,336,314	1.1299E+04
TRICHLOROETHYLENE	3.88E-05	Reference 1	8.30%	3.5600E-05	292,336,314	5.2036E+00
VINYL ACETATE	4.94E-08	Reference 1	8.30%	4.5300E-08	292,336,314	6.6214E-03
XYLENES	9.76E-03	Reference 1	8.30%	8.9500E-03	292,336,314	1.3082E+03
VOC	5.66E-01	Reference 1	8.30%	5.2270E-01	292,336,314	7.6402E+04

Sample Calculation

Vinyl Acetate

$$Emissions = \left(1 - \frac{Adjustment}{100}\right) \frac{Per\ Capita\ Emission\ Factor\ \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \left(1 - \frac{8.03\%}{100}\right) \frac{4.94 \times 10^{-8}\ \frac{lb}{person} \times 292{,}336{,}314\,people}{2000\ lb/ton} = 6.6214 \times 10^{-3}\,tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Environmental Protection Agency. “Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (Version 3).” Prepared by ERG, Inc. Research Triangle Park, NC. July 9, 2003.

4. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.1.2 Commercial and Consumer Products Usage: Automotive Aftermarket Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Automotive Aftermarket Products (SCC: 246040000) is one of seven categories within Commercial and Consumer Products Usage. CAP and HAP emission estimates for Automotive Aftermarket Products are assumed to be a function of the U.S. population(1). EPA developed per capita emission factors for the criteria pollutant VOC and for the eighteen HAPs associated with this SCC(1). Emission factors used in the 2002 inventory for this SCC are adjusted to reflect the promulgation of a national VOC 2 rule in 1998. The rule calls for a 20% reduction in VOC emissions for certain consumer products. Four consumer products in this SCC are affected by the rule. An adjusted VOC emission factor for this SCC that reflects the reduction in emissions is obtained from the 1999 Nonpoint Source NEI for HAPs.(3) Using this method, both the VOC emission factor and HAP emission factors are reduced by 8.97 %. The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(4) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.2-A. 2002 National Emissions Summary for Automotive Aftermarket Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	2002 National Emissions (tons)
BENZENE	4.72E-06	Reference 1	8.97%	4.3000E-06	292,336,314	6.2852E-01
CHLOROFORM	3.60E-05	Reference 1	8.97%	3.2800E-05	292,336,314	4.7943E+00
ETHYL BENZENE	7.51E-05	Reference 1	8.97%	6.8400E-05	292,336,314	9.9979E+00
GLYCOL ETHERS	2.69E-02	Reference 1	8.97%	2.4500E-02	292,336,314	3.5811E+03
HEXANE	3.53E-03	Reference 1	8.97%	3.2100E-03	292,336,314	4.6920E+02
HYDROGEN FLUORIDE	1.41E-05	Reference 1	8.97%	1.2800E-05	292,336,314	1.8710E+00
METHANOL	6.61E-01	Reference 1	8.97%	6.0200E-01	292,336,314	8.7993E+04
METHYL CHLOROFORM	7.63E-02	Reference 1	8.97%	6.9500E-02	292,336,314	1.0159E+04
METHYL ETHYL KETONE	3.04E-03	Reference 1	8.97%	2.7700E-03	292,336,314	4.0489E+02
METHYL ISOBUTYL KETONE	8.73E-04	Reference 1	8.97%	7.9500E-04	292,336,314	1.1620E+02
METHYL TERT-BUTYL ETHER	2.36E-05	Reference 1	8.97%	2.1500E-05	292,336,314	3.1426E+00
METHYLENE CHLORIDE	4.83E-03	Reference 1	8.97%	4.4000E-03	292,336,314	6.4314E+02
N,N-DIMETHYLFORMAMIDE	2.78E-08	Reference 1	8.97%	2.5300E-08	292,336,314	3.6981E-03
NAPHTHALENE	2.26E-06	Reference 1	8.97%	2.0600E-06	292,336,314	3.0111E-01
TETRACHLOROETHYLENE	2.35E-02	Reference 1	8.97%	2.1400E-02	292,336,314	3.1280E+03
TOLUENE	2.49E-02	Reference 1	8.97%	2.2700E-02	292,336,314	3.3180E+03
TRICHLOROETHYLENE	2.67E-04	Reference 1	8.97%	2.4300E-04	292,336,314	3.5519E+01
XYLENES	1.20E-02	Reference 1	8.97%	1.0900E-02	292,336,314	1.5932E+03
VOC	1.35E+00	Reference 1	8.97%	1.2380E+00	292,336,314	1.8096E+05

Sample Calculation

Toluene

$$Emissions = \left(1 - \frac{Adjustment}{100}\right) \frac{Per\ Capita\ Emission\ Factor \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \left(1 - \frac{8.97\%}{100}\right) \frac{2.49 \times 10^{-2} \frac{lb}{person} \times 292{,}336{,}314\, people}{2000\ lb/ton} = 3318 \times 10^{3} tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Environmental Protection Agency. “Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (Version 3).” Prepared by ERG, Inc. Research Triangle Park, NC. July 9, 2003.

4. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.1.3 Commercial and Consumer Products Usage: Coatings and Related Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Coatings and Related Products (SCC: 2460500000) is one of seven categories within Commercial and Consumer Products Usage. CAP and HAP emission estimates for Coatings and Related Products are assumed to be a function of the U.S. population(1). EPA developed per capita emission factors for the criteria pollutant VOC and for the nineteen HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for Commercial and Consumer Products are adjusted to reflect the promulgation of a national VOC rule in 1998. The rule calls for a 20% reduction in VOC emissions for certain consumer products.(2) No consumer products in this SCC are affected by the rule, therefore, emission factors are not adjusted. The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(3) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.3-A. 2002 National Emissions Summary for Coatings and Related Products

Pollutant	Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	2002 Activity Level Population	2002 National Emissions (tons)
ACETOPHENONE	8.53E-06	Reference 1	N/A	292,336,314	1.2468E+00
CARBON TETRACHLORIDE	4.10E-10	Reference 1	N/A	292,336,314	5.9929E-05
CHLOROBENZENE	1.51E-05	Reference 1	N/A	292,336,314	2.2071E+00
CHLOROFORM	9.55E-04	Reference 1	N/A	292,336,314	1.3959E+02
ETHYL BENZENE	6.86E-04	Reference 1	N/A	292,336,314	1.0027E+02
FORMALDEHYDE	8.55E-04	Reference 1	N/A	292,336,314	1.2497E+02
GLYCOL ETHERS	2.24E-03	Reference 1	N/A	292,336,314	3.2742E+02
HEXANE	2.39E-03	Reference 1	N/A	292,336,314	3.4934E+02
METHANOL	1.60E-02	Reference 1	N/A	292,336,314	2.3387E+03
METHYL CHLOROFORM	7.69E-03	Reference 1	N/A	292,336,314	1.1240E+03
METHYL ETHYL KETONE	7.94E-03	Reference 1	N/A	292,336,314	1.1606E+03
METHYL ISOBUTYL KETONE	5.26E-03	Reference 1	N/A	292,336,314	7.6884E+02
METHYLENE CHLORIDE	1.97E-02	Reference 1	N/A	292,336,314	2.8795E+03
NAPHTHALENE	5.75E-06	Reference 1	N/A	292,336,314	8.4047E-01
TETRACHLOROETHYLENE	1.48E-04	Reference 1	N/A	292,336,314	2.1633E+01
TOLUENE	3.16E-01	Reference 1	N/A	292,336,314	4.6189E+04
TRICHLOROETHYLENE	1.37E-04	Reference 1	N/A	292,336,314	2.0025E+01
TRIETHYLAMINE	5.26E-04	Reference 1	N/A	292,336,314	7.6884E+01
XYLENES	4.05E-02	Reference 1	N/A	292,336,314	5.9198E+03
VOC	9.50E-01	Reference 1	N/A	292,336,314	1.3886E+05

Sample Calculation

VOCs

$$Emissions = \frac{Per\ Capita\ Emission\ Factor \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \frac{9.5 \times 10^{-1} \frac{lb}{person} \times 292{,}336{,}314\ people}{2000\ lb/ton} = 138{,}860\ tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.1.4 Commercial and Consumer Products Usage: FIFRA-Regulated Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

FIFRA-Regulated Products (SCC: 2460800000) is one of seven categories within Commercial and Consumer Products Usage. CAP and HAP emission estimates for FIFRA-Regulated Products are assumed to be a function of the U.S. population.(1) EPA developed per capita emission factors for the criteria pollutant VOC and for the twenty HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for this SCC are adjusted to reflect the promulgation of a national VOC rule in 1998.(2) The rule calls for a 20% reduction in VOC emissions for certain consumer products. Seven consumer products in this SCC are affected by the rule. The emissions for the products affected by the rule are reduced by 20%, and an adjusted VOC emission factor for this SCC was calculated reflecting the impact of the project-level reductions on SCC-level emissions. Using this method, both the VOC emission factor and HAP emission factors are reduced by 5.08% for this SCC.

The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(3) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.4-A. 2002 National Emissions Summary for FIFRA-Regulated Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	2002 National Emissions (tons)
1,3-DICHLOROPROPENE	3.52E-02	Reference 1	5.08%	1.4437E-01	292,336,314	2.1102E+04
1,4-DICHLOROBENZENE	1.60E-01	Reference 1	5.08%	3.1818E-02	292,336,314	4.6508E+03
CHLOROBENZENE	7.16E-02	Reference 1	5.08%	6.4776E-02	292,336,314	9.4682E+03
ETHYL BENZENE	1.30E-03	Reference 1	5.08%	1.1778E-03	292,336,314	1.7216E+02
FORM ALDEHYDE	3.81E-04	Reference 1	5.08%	3.4480E-04	292,336,314	5.0399E+01
GLYCOL ETHERS	5.65E-03	Reference 1	5.08%	5.1099E-03	292,336,314	7.4690E+02
ISOPHORONE	9.47E-04	Reference 1	5.08%	8.5670E-04	292,336,314	1.2522E+02
M ETHANOL	9.48E-04	Reference 1	5.08%	8.5770E-04	292,336,314	1.2537E+02
M ETHYL BROM IDE	2.22E-01	Reference 1	5.08%	2.0136E-01	292,336,314	2.9432E+04
M ETHYL CHLOROFORM	5.99E-02	Reference 1	5.08%	5.4234E-02	292,336,314	7.9272E+03
M ETHYL ETHYL KETONE	2.01E-05	Reference 1	5.08%	1.8200E-05	292,336,314	2.6603E+00
M ETHYL ISOBUTYL KETONE	9.01E-05	Reference 1	5.08%	8.1600E-05	292,336,314	1.1927E+01
M ETHYLENE CHLORIDE	6.81E-04	Reference 1	5.08%	6.1640E-04	292,336,314	9.0098E+01
NAPHTHALENE	4.60E-02	Reference 1	5.08%	4.1601E-02	292,336,314	6.0808E+03
TETRACHLOROETHYLEN	1.92E-04	Reference 1	5.08%	1.7380E-04	292,336,314	2.5404E+01
TRIETHYLAMINE	3.13E-04	Reference 1	5.08%	2.8300E-04	292,336,314	4.1366E+01
XYLENES	1.37E-01	Reference 1	5.08%	1.2442E-01	292,336,314	1.8187E+04
VOC	1.78E+00	Reference 1	5.08%	1.6896E+00	292,336,314	2.4696E+05

Example Calculation: Chlorobenzene

$$Emissions = \left(1 - \frac{Adjustment}{100}\right) \frac{Per\ Capita\ Emission\ Factor \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \left(1 - \frac{5.08\%}{100}\right) \frac{7.16 \times 10^{-2} \frac{lb}{person} \times 292{,}336{,}314\ people}{2000\ lb/ton} = 9.4682 \times 10^{3}\ tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.1.5 Commercial and Consumer Products Usage: Household Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Household Products (SCC: 2460200000) is one of seven categories within Commercial and Consumer Products Usage. Criteria pollutant and HAP emission estimates for Household Products are assumed to be a function of the U.S. population.(1) EPA developed per capita emission factors for the criteria pollutant VOC and for the eighteen HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for this SCC are adjusted to reflect the promulgation of a national VOC rule in 1998.(2) The rule calls for a 20% reduction in VOC emissions for certain consumer products. Eighteen consumer products in this SCC are affected by the rule. An adjusted VOC emission factor for this SCC that reflects the reduction in emissions is obtained from the 1999 Nonpoint Source NEI for HAPs.(3) Using this method, both the VOC emission factor and HAP emission factors are reduced by 10.94%.

The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(4) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.5-A. 2002 National Emissions Summary for Household Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	2002 National Emissions (tons)
1,4-DICHLOROBENZENE	4.79E-02	Reference 1	10.94%	4.2660E-02	292,336,314	6.2355E+03
ETHYL BENZENE	2.56E-06	Reference 1	10.94%	2.2799E-06	292,336,314	3.3325E-01
ETHYLENE DICHLORIDE	3.52E-08	Reference 1	10.94%	3.1349E-08	292,336,314	4.5822E-03
FORM ALDEHYDE	6.74E-06	Reference 1	10.94%	6.0026E-06	292,336,314	8.7740E-01
GLYCOL ETHERS	5.31E-03	Reference 1	10.94%	4.7291E-03	292,336,314	6.9124E+02
HEXANE	2.09E-03	Reference 1	10.94%	1.8614E-03	292,336,314	2.7207E+02
HYDROCHLORIC ACID	1.75E-06	Reference 1	10.94%	1.5586E-06	292,336,314	2.2781E-01
HYDROGEN FLUORIDE	8.75E-08	Reference 1	10.94%	7.7928E-08	292,336,314	1.1391E-02
M ETHANOL	6.66E-04	Reference 1	10.94%	5.9314E-04	292,336,314	8.6698E+01
M ETHYL CHLOROFORM	2.85E-02	Reference 1	10.94%	2.5382E-02	292,336,314	3.7101E+03
M ETHYL ETHYL KETONE	4.49E-04	Reference 1	10.94%	3.9988E-04	292,336,314	5.8450E+01
M ETHYL ISOBUTYL KETONE	1.08E-04	Reference 1	10.94%	9.6185E-05	292,336,314	1.4059E+01
M ETHYLENE CHLORIDE	2.39E-03	Reference 1	10.94%	2.1285E-03	292,336,314	3.1112E+02
NAPHTHALENE	5.52E-07	Reference 1	10.94%	4.9161E-07	292,336,314	7.1858E-02
TETRACHLOROETHYLEN	2.96E-03	Reference 1	10.94%	2.6362E-03	292,336,314	3.8532E+02
TOLUENE	5.82E-04	Reference 1	10.94%	5.1833E-04	292,336,314	7.5763E+01
TRICHLOROETHYLENE	4.34E-05	Reference 1	10.94%	3.8652E-05	292,336,314	5.6497E+00
XYLENES	3.28E-03	Reference 1	10.94%	2.9212E-03	292,336,314	4.2698E+02
VOC	7.81E-01	Reference 1	10.94%	7.0360E-01	292,336,314	1.0284E+05

<u>**Example Calculation: Napthalene**</u>

$$Emissions = \left(1 - \frac{Adjustment}{100}\right) \frac{Per\ Capita\ Emission\ Factor\ \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \left(1 - \frac{10.94\%}{100}\right) \frac{552 \times 10^{-7}\ \frac{\text{lb}}{\text{person}} \times 292{,}336{,}314\, people}{2000\ lb/ton} = 7.1858 \times 10^{-2}\ tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Environmental Protection Agency. “Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (Version 3).” Prepared by ERG, Inc. Research Triangle Park, NC. July 9, 2003.

4. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.1.6 Commercial and Consumer Products Usage: Miscellaneous

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Miscellaneous Products (SCC: 2460900000) is one of seven categories within Commercial and Consumer Products Usage. Criteria pollutant and HAP emission estimates for Miscellaneous Products are assumed to be a function of the U.S. population.(1) EPA developed per capita emission factors for the criteria pollutant VOC and for the eighteen HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for Commercial and Consumer Products are adjusted to reflect the promulgation of a national VOC rule in 1998. The rule calls for a 20% reduction in VOC emissions for certain consumer products.(2) No consumer products in this SCC are affected by the rule, therefore, emission factors are not adjusted.

The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(3) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.6-A. 2002 National Emissions Summary for Miscellaneous Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	2002 Activity Level Population	2002 National Emissions (tons)
GLYCOL ETHERS	2.42E-04	Reference 1	N/A	292,336,314	3.5373E+01
M ETHANOL	1.84E-02	Reference 1	N/A	292,336,314	2.6895E+03
M ETHYL CHLOROFORM	2.46E-04	Reference 1	N/A	292,336,314	3.5957E+01
M ETHYL ETHYL KETONE	1.01E-05	Reference 1	N/A	292,336,314	1.4763E+00
M ETHYLENE CHLORIDE	2.38E-05	Reference 1	N/A	292,336,314	3.4788E+00
N,N-DIMETHYLFORMAMIDE	7.43E-06	Reference 1	N/A	292,336,314	1.0860E+00
TETRACHLOROETHYLENE	7.53E-04	Reference 1	N/A	292,336,314	1.1006E+02
TOLUENE	2.46E-06	Reference 1	N/A	292,336,314	3.5957E-01
XYLENES	4.31E-04	Reference 1	N/A	292,336,314	6.2998E+01
VOC	7.00E-02	Reference 1	N/A	292,336,314	1.0232E+04

Example Calculation: Methanol

$$Emissions = \frac{Per\ Capita\ Emission\ Factor \frac{lb}{person} \times 2002\ Population}{2000\ lb/ton}$$

$$Emissions = \frac{1.84 \times 10^{-2} \frac{lb}{person} \times 292{,}336{,}314\, people}{2000\ lb/ton} = 2.6895 \times 10^{3}\ tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.

5.10.1.7 Commercial and Consumer Products Usage: Personal Care Products

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Personal Care Products (SCC: 2460100000) is one of seven categories within Commercial and Consumer Products Usage. Criteria pollutant and HAP emission estimates for Personal Care Products are assumed to be a function of the U.S. population.(1) EPA developed per capita emission factors for the criteria pollutant VOC and for the eight HAPs associated with this SCC.(1) Emission factors used in the 2002 inventory for this SCC are adjusted to reflect the promulgation of a national VOC rule in 1998.(2) The rule calls for a 20% reduction in VOC emissions for certain consumer products. Eight consumer products in this SCC are affected by the rule. An adjusted VOC emission factor for this SCC that reflects the reduction in emissions is obtained from the 1999 Nonpoint Source NEI for HAPs.(3) Using this method, both the VOC emission factor and HAP emission factors are reduced by 12.11%.

The adjusted per capita emission factors are multiplied by the 2002 U.S. Census Bureau estimate of the population in each County to obtain the county-level emissions.(4) Appendix B [of the Preliminary NEI Documentation] contains population data in database format.

Table 5.10.1.7-A. 2002 National Emissions Summary for Personal Care Products

Pollutant	Original Emission Factor (lbs per capita)	Emission Factor Reference	Adjustment to Emission Factor	Revised Emission Factor (lbs per capita)	2002 Activity Level Population	National Emissions (tons)
ACETAMIDE	1.38E-07	Reference 1	12.11%	1.2129E-07	292,336,314	1.7728E-02
ETHYLENE DICHLORIDE	4.62E-06	Reference 1	12.11%	4.0605E-06	292,336,314	5.9352E-01
GLYCOL ETHERS	1.52E-05	Reference 1	12.11%	1.3359E-05	292,336,314	1.9527E+00
M ETHANOL	5.67E-07	Reference 1	12.11%	4.9834E-07	292,336,314	7.2841E-02
M ETHYL CHLOROFORM	7.45E-04	Reference 1	12.11%	6.5478E-04	292,336,314	9.5708E+01
M ETHYL ETHYL KETONE	1.75E-05	Reference 1	12.11%	1.5381E-05	292,336,314	2.2482E+00
N,N-DIMETHYLFORMAMIDE	2.71E-05	Reference 1	12.11%	2.3818E-05	292,336,314	3.4815E+00
TOLUENE	3.41E-03	Reference 1	12.11%	2.9970E-03	292,336,314	4.3807E+02
VOC	2.29E+00	Reference 1	12.11%	2.0400E+00	292,336,314	2.9818E+05

Example Calculation: Acetamide

$$Emissions = \left(1 - \frac{Adjustment}{100}\right) \frac{Per\ Capita\ Emission\ Factor \frac{lb}{person} \times 2002\ Population}{2000\ lb / ton}$$

$$Emissions = \left(1 - \frac{12.11\%}{100}\right) \frac{1.38 \times 10^{-7} \frac{\text{lb}}{\text{person}} \times 292{,}336{,}314\ people}{2000\ lb / ton} = 1.7728 \times 10^{-2} tons$$

References

1. U.S. Environmental Protection Agency. August 1996. *Emission Inventory Improvement Program: Preferred and Alternative Methods for Estimating Air Emissions.* Volume III, Chapter 5. Research Triangle Park, North Carolina.

2. 63FR48819. National Volatile Organic Compound Emission Standards for Consumer Products. Final Rule. September 11, 1998.

3. U.S. Environmental Protection Agency. “Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutants (Version 3).” Prepared by ERG, Inc. Research Triangle Park, NC. July 9, 2003.

4. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.10.2 Pesticide Application

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the emissions estimates for Pesticide Application (SCC: 2461850000) for the 2002 NEI.

The quantities and types of pesticides used in 2002 in Maine were available through the state Board of Pesticides Control, Department of Agriculture,1999 database of pesticides sold to licensed applicators.[75] However, upon careful review of this database, it was discovered that some of the pesticide brand name quantities were volumes sold for the six New England States.[76] Therefore, the emission estimates for Pesticide Application in Maine are over estimated. Maine also assumed the density of the pesticide solutions to be that of water. So, gallons sold were converted to pounds by multiplying 8.33 lb./gallon.

[75] Email correspondence with data for pesticide sales and use in Maine, Gary Fish, Maine Board of Pesticides Control
[76] Discussion with Ann Pistell DEP Bureau of Remedial Waste Management & David W. Wright Bureau of Air Quality, Program & Planning, Toxics and Emission Inventories, January 2003.

Methodology

Utilizing the EPA and California database which categorizes the potential of VOC emissions for pesticides,[77] the Maine DEP was able to determine the VOC potential emissions for each product. Due to the fact that the expected date for the complete release of the 2002 Census of Agriculture is June 3, 2004,[78] the 1996[79] data was used to determine the percentage of acres which pesticides were applied in Maine's counties. DEP utilized the Bureau of Labor Statistics (BLS) growth factor (1.1111)[80] applied to the 1996 base year to estimate the acreage for pesticide application in 2002. Seasonality was apportioned to spring, summer, and fall, or 274 days.

Hazardous Air Pollutant (HAP) emission factors were determined according to the 1999 National Emissions Inventory.[81] Hexachlorobenzene (HCB) emissions were calculated by the percentage found in seven pesticides with the assumption that 8.4% of the HCB available is volatilized in to the atmosphere. The seven pesticides are: 1) picloram, 2) chlorothalonil, 3) pentachloronitrobenzene (PCNB), 4) atrazine, 5) simazine, 6) dacthal (DCPA), and 7) lindane.

Additional HAP emission from pesticides were; 2,4-Dichlorophenoxy Acetic Acid (2,4-D), captan, carbaryl, methyl bromide, and trifluralin.[82] The volatilization rates and vapor pressures were used as presented in the July version of the 2002 NEI.

Sample Calculation

County Acres of Pesticide Application 1996 X growth factor = Adjusted County Acres of Pesticide Application 2002.

Adjusted County Acres of Pesticide Application 2002 / State Total of Pesticide Application = % County acres of Pesticide Application.

VOCs

Total Potential VOCs Emitted in Maine X % County acres of Pesticide Application = VOCs Emitted in County per year.

VOCs Emitted in County per year X 274 days = VOCs in Tons Per Summer Week-Day (tpswd).

HAPs

Total Pesticide Applied X % HAP Chemical in amount of pesticide = Amount HAP Chemical applied.

Amount HAP Chemical applied X % HAP in Chemical X % volatilization = Amount Emitted.

Total Potential HAP Emitted in Maine X % County acres of Pesticide Application = HAPs Emitted in County per year.

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[77] CA database of VOC Potential to Emit from Pesticides: http://www.cdpr.ca.gov/docs/pur/vocproj/vocmenu.htm
[78] www.usda.gov/nass. "The expected date for the complete release of the 2002 Census of Agriculture is June 3, 2004 and will be available at www.usda.gov/nass ."
[79] Table 10. Agricultural Chemicals Used: 1997, U.S. Census of Agriculture, pages 186-187
[80] EPA EGAS model, file PHY.SCC, created on Wednesday, March 24, 2004 8:14:34.
[81] EPA Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants, September 30, 2002.
[82] nonpoint99ver3_july2003.pdf, 1999 NEI Appendix A: NEI Nonpoint HAP Source Estimates - Pesticide Application SCC: 2461850000, Table 2, page A-69.

Sample Calculation for Cumberland County

449 Acres of Pesticide Application in Cumberland County in 1996 X 1.1111 = 499 Adjusted Acres of Pesticide Application in Cumberland County in 2002

499 Acres of Pesticide Application in Cumberland County in 2002 / 130,808 Total Acres of Pesticide Applied in Maine x 100 = 1.35 % Pesticide Application in Cumberland County.

VOCs

172.25 Tons VOCs of Pesticides applied in Maine x 100% x 1.35 % Pesticide Application in Cumberland County = 2.33 Tons VOCs from Pesticide Application in Cumberland County.

tpswd: 2.33 Tons VOCs / 274 Days of Application = 0.0085 tpswd

HAPs

2,4- Dichlorophenoxy Acetic Acid (2,4-D) from the 1999 Pesticide license applicators database:

AMOUNT SOLD	Units	Conversion to pounds	TRADE NAME(S)	CAS Number	% Ingredient
16,425	POUNDS	16,425	PRO TURF 20-3-3 W/ TRIMEC	94-75-7	0.684
10,940	POUNDS	10,940	FERTILIZER PLUS WEED CONTROL 32-4-3; PROTURF FERTILIZER PLUS DICOT WEED, CONTROL III, 32-4-3	94-75-7	1.22
9,873	POUNDS	9,873	GORDON'S TRI-MECH; GREEN GOLD WEED & FEED 30-3-4; PROSCAPE WEED & FEED 25-3-8	94-75-7	0.684
3,300	POUNDS	3,300	TURF PRO FERT WEED & FEED W/ TRIMEC	94-75-7	0.547
2,250	POUNDS	2,250	SEARS SUPERFINE PREMIUM WEED & FEED	94-75-7	0.611
1,940	POUNDS	1,940	SUPER TURF BLDG W/ PLUS 2 WEED CTRL 29-3-3; SUPER TURF BLDR W/ PLUS 2 WEED CTRL 30-3-3; SUPER TURF BUILDER PLUS 2, 34-3-3; TURF BUILDER +2, 28-3-3; TURF BUILDER W/ PLUS 2 WEED CONTROL	94-75-7	1.49
1,528	POUNDS	1,528	AGWAY GREENLAWN WEED CTRL 31-3-5; GREENLAWN WEED CONTROL & LAWN FERT W/TRIMEC 31-3-5	94-75-7	0.761
70	GALLONS	583.1	WEED-B-GON LAWN WEED KILLER	94-75-7	10.8
24	POUNDS	24	BROADSTRIKE POST - CORN; SCORPION III	94-75-7	50
17	POUNDS	17	WEED & FEED, 27-3-6	94-75-7	1.18
13	GALLONS	108.29	CLEAN CROP AMINE 4 2,4-D WEED KILLER	94-75-7	52
12	GALLONS	99.96	RIVERSIDE 2,4-D LV4	94-75-7	63.7
10	POUNDS	10	LTP LAWN WEED CONTROL TRIMEC	94-75-7	1.3677
2	GALLONS	16.66	CLEARY'S MCPP 2,4-D BROADLEAF HERBICIDE	94-75-7	14.8

The total 2,4D amount applied is 578.20407 pounds. 100% of 2,4-D is a HAP and 58% is volatile resulting in 202 pounds emitted or 1.01E-01 tons.

1. 01E-01 Tons 2,4-D applied in Maine x 100% x 1.35 % Pesticide Application in Cumberland County = 1.37E-03 Tons (2.7383263 pounds) of 2,4-D emissions in Cumberland County.

Areas for Improvement

Aggregating both agricultural and non-agricultural pesticide use and apportioning this total by county acres to receive pesticide application presents a significant uncertainty in the reliability of county emissions estimates because:

(1) It fails to take into account the unequal distribution of crops and the average amount of pesticides used per crop across Maine. For example, there are approximately 73,000 acres of potatoes in Maine and 65,000 of those acres are in Aroostook County alone[83]. Potato crops receive five or more pesticide applications per year, unlike blueberries which receive, at most, two applications per year in their bearing year.

(2) Growing out the 1999 data may overestimate VOC emissions from agricultural pesticides. Per conversation with Maine Board of Pesticides Control, agricultural pesticides are moving away from highly volatile, petroleum bases to water-based formulations[84].

Ideally, two approaches should be used to estimate VOC and HAPs emissions from pesticides.

(1) The first approach would calculate non-agricultural pesticide use (municipal, industrial and commercial) based on a compilation of annual licensed commercial pesticide applicator reports provided to the Maine Board of Pesticides Control. This information would be summed to the state level, appropriate emissions calculated, and then divided by population, as most licensed commercial applicators work in multiple counties; and

(2) The second approach would distribute agricultural pesticides sales data (for both general and restricted use products) reported by Maine's Restricted Use Pesticide dealers by crop. Then, using the *AgCensus,* pesticide use could reasonably be estimated at county level based on the acres of each crop in the county. The approach could further be simplified by solely assessing pesticides used on Maine's primary agricultural crops: potatoes, corn, blueberries, apples, market vegetables, and oats.[85]

5.10.3 Solvent Use

5.10.3.1 Solvent Use: Degreasing

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the emissions estimates for Solvent Use: Degreasing – Electronics (SCC: 2415030000); Solvent Use: Degreasing – Miscellaneous Manufacturing (SCC: 2415045000); Solvent Use: Degreasing – Auto Repair Services (SCC: 2415065000); and Solvent Use: Degreasing – Cold Cleaning (SCC: 2415300000) for the 2002 NEI. All emission estimates from SCC 2415000000, Solvent Use: Degreasing – All Processes/All Industries, are being deleted because the category double counts emissions in the subcategories specified above.

[83] *AgCensus: The U.S. Census of Agriculture: 1987, 1992, and 1997*, courtesy of the Mann Library, Cornell University, http://agcensus.mannlib.cornell.edu/.
[84] Personal conversation with Henry Jennings, Chief of Compliance, Maine Board of Pesticides Control, May 17, 2004.
[85] Given that little or no pesticides are used on hay and green chop acreage, these six crops – potatoes, corn, blueberries, applies, market vegetables and oats – account for approximately 84% of the agricultural commodity acreage likely to receive pesticide applications in Maine (data derived from the 1997 *AgCensus*).

Methodology

Maine DEP calculated 2002 emissions for surface cleaning based on a per employee basis, and for VOC emissions, we assumed that activity occurred 6 days per week. Maine DEP estimated 2002 employment[86] by using 1999[87] employee population from the U.S. Census County Business patterns and applying the appropriate Bureau of Labor Statistics growth factor for each sub category. To prevent double counting for sources covered under Maine's point source inventory, point source employees for 2002 were subtracted from the projected employment for 2002. The EIIP[88], VOC emission factor was utilized for surface cleaning operations used in automotive repair, manufacturing, electronics, cold cleaning degreasing, and other miscellaneous surface cleaning operations. The HAP emissions were calculated based on the 1999 National Emissions Inventory percentage of contribution.[89]

BLS Growth Factors (adjusted 1999 to 2002).

Category	SCC	BLS Growth Factor
Solvent Degreasing - Electronics (SIC 36)	2415030000	1.195753
Solvent Degreasing – Miscellaneous Manufacturing (SIC 39)	2415045000	1.2
Solvent Degreasing - Automobile Repair (SIC 75)	2415065000	1
Solvent Degreasing - Cold Cleaning	2415300000	1.195753

Sample Calculation

1999 total employee population – 1999 point source employee population =
1999 area source employee population

1999 area source employee population x VOC emission factor =
1999 VOCs for solvent degreasing

1999 VOCs for solvent degreasing x BLS Growth Factor =
2002 VOCs for solvent degreasing

2002 VOCs for solvent degreasing x percentage of HAP = HAP emissions.

Surface Cleaning/Solvent Degreasing – Miscellaneous Manufacturing (SIC 39) – Cumberland County

1999 employees for Solvent Degreasing – Miscellaneous Manufacturing = 6,799
1999 point source employees for Solvent Degreasing – Miscellaneous Manufacturing = 3,786

1999 area source employees = 6,799 – 3,786 = 3,013 employees

1999 VOCs for Solvent Degreasing – Miscellaneous Manufacturing =
3,013 employees X 24 lbs. VOC per employee ÷ 2,000 lbs/ton = 3.62E+01 tons VOC per year in 1999 for Cumberland County

BLS growth factor calculation:

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86 Email mcconnell.robert@epamail.epa.gov, Tue 3/23/2004 4:15 PM, EGAS model for BLS projections.
87 http://www.census.gov/econ/census02/ "Data for states, metropolitan areas, counties, and cities will be published state by state and sector by sector, starting in late 2004 and finishing in mid 2005."
88 EPA, EIIP Volume III, Chapter 6, Solvent Cleaning, Table6.5-2 Per Capita and Per Employee Solvent Cleaning Emission Factors, Sept. 1997.
89 EPA 1999 NEI documentation "nonpt99ver3_aug2003.pdf" Appendix A, page A-44. August 2003.

{(Growth factor target year - Growth factor Base year)/ Growth factor base year } + 1[90]
{(1.3158 – 1.0965) / 1.0965} + 1 = 1.2

2002 VOCs for Solvent Degreasing – Miscellaneous Manufacturing =
3.62E+01 tpy x 1.2 = 4.34E+01 tpy VOC for Cumberland County in 2002

Seasonal apportionment

4.34E+01 tpy VOC per year for Cumberland County / 260 days operation per year =
1.67E-01 tpswd VOC

HAP emissions

HAP	%Total VOCs	Tons/year
Methylene Chloride	6.77	2.94E+00
Tetrachloroethylene (Perchloroethylene)	8.38	3.64E+00
1,1,1-Trichloroethane (Methyl Chloroform)	56.14	2.44E+01
Trichloroethylene	28.72	1.25E+01

5.10.3.2 Solvent Use: Graphic Arts

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the emissions estimates for Graphic Arts (SCC: 2425000000) for the 2002 NEI.

Methodology

The Maine DEP used EPA's EIIP Volume III, Chapter 7 per capita emission factor of 1.3 pounds VOCs per person[91] to predict emissions from graphic arts facilities as applied to the 2002 county population.

Graphic art facilities which were categorized as point sources were subtracted out of their respective county,[92] however, this was an insignificant amount. The Maine DEP applied the Bureau of Labor Statistics (BLS) adjusted growth factor (1.083928)[93] to the 1999 number of employees from the County Business Patterns[94] for SIC Code 2754 - Commercial Printing Gravurein to estimate the 2002 employees. However, since the only two, point source facilities have a maximum of 4 employees each, applying the growth factor resulted in virtually no employee increase.

Seasonality was apportioned to spring, summer, and fall or 274 days. Seasonal apportionment was applied to 260 days per year to derive the tons per summer week day (tpswd).

Hazardous Air Pollutant (HAP) emissions were determined according to the 1999 National Emissions Inventory method of speciated VOCs.[95]

[90] Email correspondence; mcconnell.robert@epamail.epa.gov, Wed 4/11/2001 1:09 PM & Tue 4/17/2001 10:00 AM
[91] EPA, EIIP Volume III, Chapter 7, Formula 7.5-6, pages 7.5-10, November 1996.
[92] 2002 Maine Manufacturing Directory, 34 Diamond Street, Portland, Maine, November 2002. (SIC 323111 Commercial gravure printing).
[93] EPA EGAS model, file PHY.SCC, created on Wednesday, March 24, 2004 8:14:34.
[94] County Business Patterns 1999, United States Department of Commerce, Bureau of the Census http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl
[95] EPA Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants, September 30, 2002.

Sample Calculation

County Population – Facility Employees = Adjusted County Population

Adjusted County Population X Emission Factor = County Emissions

HAPs emissions = County VOC emissions X % HAP

HAP	% Total VOCs
Toluene	6.48
Dibutyl Phthalate	10
Toluene Diisocyanate	0.01
Methyl Carbitol	0.04
Methyl Ethyl Ketone	54.27
Methyl Isobutyl Keton	14.78

Cumberland County Example

269,129 persons – 4 employees = 269,125 persons

VOCs

269,125 persons x 1.3 lbs./person/year = 349,862.5 pounds VOCs per year

349,862.5 pounds VOCs per year /2,000 lbs. = 175 tons/year

175 tpy / 260 days of operation = 6.73E-01 tpswd

HAPs

Toluene Speciate of VOCs is 6.48 percent.

175 tons VOCs per year X 6.48% = 11.3 tons per year

5.10.3.3 Solvent Use: General Laboratory

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is applying the 1999 National to Maine ratio of emissions apportioned to Maine 2002 population for Solvent Use: General Laboratory (SCC: 31503001) estimates.

Methodology

The 1999 ratio of mercury emissions for General Laboratories was derived by determining the percentage by population Maine contributed to the National emission estimate.

0.9 Tons mercury emitted Nationally in 1999 for General Laboratory.
National population for 2002 = 287,973,924
Maine's population for 2002 = 1,294,464
Or 2.22%

So 0.9 Tons mercury Nationally x 2.2% = $2.00E^{-2}$ Tons for Maine in 2002.

To determine the 2002 emissions for General Laboratories the $2.00E^{-2}$ Tons for Maine in 1999 was apportioned to the 2002 State of Maine population.

Sample Calculation

Cumberland County

Cumberland County 2002 population is 269,083
State of Maine 2002 population is 1,294,464
Or 20.79%

So $2.00E^{-2}$ Tons for mercury Maine in 2002 x 20.79% = $4.16E^{-3}$ Tons of mercury from General Laboratories for Maine in 2002.

5.10.3.4 Solvent Use: Hospital Sterilization

Solvent Use: Hospital Sterilization (SCC: 2850000010) is a MACT category, and there are no sources in Maine so we will no longer be including emissions from this category.

5.10.3.5 Solvent Use: Perchloroethylene Dry Cleaners

Maine DEP contact: Rich Greves (207)287-7030 or Rich.Greves@Maine.gov

Maine is updating the emissions estimates for Perchloroethylene Dry Cleaners (SCC: 2420000055) for the 2002 NEI. In doing so, Maine is no longer reporting emissions under Dry Cleaning: All Processes (SCC: 2420000000), as perchloroethylene is the only pollutant of concern.

EPA Methodology

EPA determined that there are three (3) different SCC codes for Dry Cleaners. They are 2420000055 (perchloroethylene; All Processes), 2420010055 (perchloroethylene; Commercial/Industrial Cleaners), and 2420020055 (perchloroethylene; Coin-operated Cleaners). It appears that some sort of per capita estimate was used to determine the amount of perchloroethylene that was emitted. EPA estimated that a total of 542,040 pounds of perchloroethylene was emitted in Maine.

Maine Methodology

Under the authority of Chapter 125, Maine is required to collect and maintain a registry of all perchloroethylene dry cleaners in the state. In CY 2002, this survey showed that there was only 34,722 pounds of perchloroethylene emitted. After looking at the 2002 survey more closely, it was determined that the survey was not 100% accurate. According to the hazardous waste manifests, there were 56 active dry cleaners in 2002, and we only surveyed 31 of them. But these 31 cleaners were a good representation of the 56, so we multiplied 34,722 * (56/31) to get 62,724 pounds of perchloroethylene.

Sample Calculation

Perchloroethylene (pounds) x (County population/State population) / 2000 lbs/ton
= Perchloroethylene (tons/county)

Androscoggin County
62,724 lbs. perchloroethylene x (104,805 / 1,294,464) / 2000
= 2.54 tons in Androscoggin County

5.10.3.6 Solvent Use: Paint stripping

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine is accepting EPA's methodology and approach for estimates for Solvent Use: Paint Stripping (SCC: 682400591) for the 2002 NEI.

EPA 2002 Methodology

In EPA's preparation plan for the 2002 NEI, EPA states that the emissions from this source category (SCC: 682400591) will be rolled forward from the 1999 NEI. EPA's 1999 estimations for this source category were based on ESD calculations that were done during MACT rule development. A description of the methodology is contained in a memo titled "Paint Stripping Industry Emission Rates" and is as follows:

> "we (EPA) was not able to find reliable estimates of current paint stripping HAP emissions for the paint stripping area source (PSAS) industry. Therefore, we (EPA) used an estimate of total methylene chloride use for 2001, and a breakdown of methylene chloride stripper use by industry sector, to estimate current PSAS methylene chloride emissions. A typical paint stripper chemical profile was then used to convert the amount of methylene chloride emissions into an estimate of total HAP emissions from the PSAS source category." [96]

Since the details of the calculations for Maine were not included in this memo Maine DEP was unable to verify emission estimates or the activity data for this source category. Maine DEP accepts the methodology and approach for emissions from this category. Emission estimates attributed by EPA to Maine's counties are assumed to be correct.

5.10.4 Solvent Use: Surface Coating

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

This heading contains nineteen source categories.

Category	SCC
Architectural Coatings	2401001000
Auto Refinishing (SIC 7532)	2401005000
Traffic Markings	2401008000
Factory Finished Wood (SIC 2426 thru 242x)	2401015000
Wood Furniture (SIC 25)	2401020000
Metal Furniture (SIC 25)	2401025000
Paper (SIC 26)	2401030000
Metal Cans (SIC 341)	2401040000
Misc. Finished Metals (SIC 34 – 341+3498)	2401050000
Machinery and Equipment (SIC 35)	2401055000
Large Appliances (SIC 363)	2401060000

[96] From David Hendricks, Shannon Ogren, EC/R Inc. and Mary-Jo Caldwell, Caldwell Environmental Inc. to Tony Wayne, U.S. EPA, dated September 30, 2002.

Category	SCC
Electronic and Other Electrical (SIC 36-363)	2401065000
Motor Vehicles (SIC 371)	2401070000
Aircraft (SIC 372)	2401075000
Marine (SIC 373)	2401080000
Railroad (SIC 374)	2401085000
Misc. Manufacturing	2401090000
Industrial Maintenance Coatings	2401100000
Other Special Purpose Coatings	2401200000

For most categories, the method used is the "preferred method" as described in Table 8.3-1 of the Emission Inventory Improvement Project (EIIP) Vol. III.(1) The total point source emissions were determined by polling the Maine DEP criteria inventory database. From this data, the total emissions from the point sources in a given category were obtained as well as employment and seasonal activity for that category. The total emissions from point sources were divided by the total number of employees at those point sources. This resulted in lbs. of VOC per employee for a given source category. This number was compared to the national default to see if it was in the same order of magnitude. Next, the area source data was gathered from Tower Publishing 2003 Maine Manufacturing Directory.(2) The data collected from Tower Publishing (2) includes facility, location, county, number of employees, and the SIC codes. The sources found were compared to the Maine DEP toxics inventory so actual data could be used instead of emission factor generated data. For some of the larger area sources, the air emission licenses were also checked. If a license contains emission information which seemed more appropriate than the local point source emission factor, the license emission value (licensed allowed) was used. For activity, it was assumed that surface coating sources were in operation 5 days per week (or 65 days during the ozone season).

In some cases, the area source who did not list the number of employees in Tower Publishing. These sources were contacted. If it was not possible to contact an area source, a value of 1 employee was used for the source in question. It was found that most sources that did not report the employee number to Tower Publishing had only one employee.

If it was not possible to derive a local emission factor for a given category, the national default emission factors based on employment were used. These national default values are listed in Table 8.5-1 of EIIP, Volume III. The local emissions factors derived for the 1999 emission inventory were used for this inventory as well. These categories were not corrected for acetone. Discussion with several sources revealed that acetone is not included in the VOC calculation.

HAPs emissions for these source categories were determined using the Speciate program. (3)

Acetone Correction: In the early 1990's, EPA determined that acetone was not an Ozone precursor. However, companies often included acetone in VOC emission statements filed with Maine DEP. In the 1999 inventory, Maine DEP corrected the area source surface coating categories for acetone. That is, once we determined a local VOC emission factor based on point source emissions in lbs of VOC/employee, we subtracted the percentage acetone from this number. However, the Maine DEP did a spot survey and determined that in 2002 the VOC's reported to Maine DEP by point sources did not include the acetone component in its VOC emission estimate. Actually, some of them changed to products high in acetone to lower the (photoreactive) VOC content of their coatings, in order to reduce VOC emissions. Based on this Maine DEP did not correct for acetone for the 2002 inventory.

Following are the descriptions of the surface coating subcategories

5.10.4.1 Surface Coating: Architectural Coatings

Maine accepts the methodology and approach for VOC and HAP emissions from architectural surface coatings (SCC: 2401001000) as presented in Appendix A of the "Documentation for the 2002 Nonpoint source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version)." Therefore the emission estimates attributed by EPA to Maine's counties are assumed to be correct.

EPA 2002 Methodology

Descriptions of methodology as taken from "Documentation for the 2002 Nonpoint source National Emissions Inventory (NEI) for Criteria and Hazardous Air Pollutants: January 2004 Version," Emission Factor and Inventory Group (D205-01), Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, EPA Contract No. 68-D-02-063, March 30, 2004.

Emissions from Architectural Surface Coatings are those emitted from the application of coating such as paint, primer, varnish or lacquer to architectural surfaces, and the use of solvents as thinners and for cleanup.(1) Table 5.10.4.1-1 present U.S. Census Bureau data on the quantity of solvent- and water-based architectural coatings shipped in 2002.(2) These data are used to estimate criteria and HAP emissions from the use of architectural coatings.

Table 5.10.4.1-A. Architectural Coatings Shipped in 2002 (1)

Type of Coating	Solvent Based (SB) (gal/yr)	Water Based (WB) (gal/yr)
Exterior Coatings	70,967,000	182,423,000
Interior Coatings	48,947,000	407,104,000
Total	119,914,000	589,527,000

Usage Factor: (gal/person/year)
Solvent-Based Coatings: 0.4158
Water-Based Coatings: 2.0444

Per capita usage factors for solvent-based and water-based coatings are estimated by dividing the total volume of each type of coating shipped by the 2002 U.S. Population, 288,368,698.(2) Table 5.10.4.1-B presents the usage factors calculated for year 2002.

Table 5.10.4.1-B. Usage Factors for Architectural Coatings

Type of Coating	Usage Factor (gal/person/year)
Solvent Based	0.4158
Water Based	2.0444

Emission Factors

Solvent-based and water-based coatings contain different amounts of VOC and HAP constituents. Therefore, there are separate VOC and HAP emissions factors for each type of coating. EPA developed VOC emission factors based on the VOC content of each type of coating which are given below.(3)

Solvent-based coatings - 3.87 lb VOC per gallon

Water-based coatings - 0.74 lb VOC per gallon

Starting in September 1999, manufacturers and importers of architectural surface coatings are required to limit the VOC content of architectural coatings manufactured for use in the United States.(3) Because information is not available to estimate updated solvent and water-based coating emission factors, it is assumed that the impact of these regulations is reflected though the Census Bureau data indicating decreases in solvent-based coatings shipments and increases in water-based coatings shipments over the last several years.

HAP emissions factors are calculated as the VOC emission factor multiplied by the weight fraction of each HAP in the coating as given in the following equation.(4)

$$\text{HAP Emission Factor} = \text{VOC Emission Factor} \times \text{HAP Weight Fraction}$$

Table 5.10.4.1-C presents the VOC and HAP emission factors for solvent-based and water-based coatings.

Emissions are calculated by multiplying the emissions factor for each pollutant and coating type by the usage factor calculated for each coating type and the U.S. population. Appendix B of the "Documentation for the 2002 Nonpoint source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version) contains population data in database format. The equation for estimating emissions is:

$$\text{Emissions (lbs/year)} = \text{Emission Factor (lbs/gal)} \times \text{Usage factor (gal/person/year)} \times \text{U.S. Population}$$

Emissions from solvent based coatings and water based coatings are estimated separately, then added together resulting in national-level emissions from the use of architectural surface coatings. National emissions are allocated to each county in the United States using the ratio of the county proportion to the national population.(2) Appendix B of the "Documentation for the 2002 Nonpoint source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version)" contains population data in database format.

Table 5.10.4.1-C. VOC Speciation Factors and Emissions Factors for HAPs(4)

Pollutant	Weight Fraction	Emissions Factor (lb/gal)
Solvent-Based Coatings		
N,N-Dimethylformamide	0.005	0.01935
Ethylbenzene	0.043	0.16641
Ethylene Glycol	0.006	0.02322
Hexane	0.207	0.80109
Isomers of Xylene	0.026	0.10062
Methyl Ethyl Ketone	0.056	0.21672
Methyl Isobutyl Ketone	0.006	0.02322
Toluene	0.052	0.20124
VOC	1.000	3.87

Pollutant	Weight Fraction	Emissions Factor (lb/gal)
Water-Based Coatings		
Benzene	0.003	0.00222
Methylene Chloride	0.055	0.0407
Ethyl Chloride	0.006	0.00444
Ethylene Glycol	0.005	0.0037
Methyl Chloride	0.005	0.0037
VOC	1.000	0.74

The national architectural coating shipments data does not include Puerto Rico or U.S. Virgin Islands shipments. Emissions for Puerto Rico and the U.S. Virgin Islands were estimated using the approach outlined in the report text. Broward County in Florida is assumed to be the surrogate county for Puerto Rico. Monroe County in Florida is assumed to be the surrogate for the U.S. Virgin Islands. VOC and HAP emissions in the surrogate counties were divided by the population of the surrogate counties obtained from the U.S. Census Bureau to estimate emissions on a per capita basis[2]. Appendix B of the "Documentation for the 2002 Nonpoint source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version) contains population data in database format. The per capita emissions were then multiplied by the population in each county of Puerto Rico and the U.S. Virgin Islands to estimate emissions.

Table 5.10.4.1-D presents the national emissions for VOC and HAPs by coating type. Total emissions for the United States, Puerto Rico and the U.S. Virgin Island are also presented.

Table 5.10.4.1-D. National Emissions Summary for Water-Based and Solvent-Based Architectural Coatings

Pollutant	Usage Factor	Emission Factor	Emission Factor Reference	2002 National Activity	Solvent-Based Emissions [a] (ton/yr)	Water-Based Emissions [a] (ton/yr)	Total Emissions [b] (ton/yr)
Benzene	See Table 2	See Table 3	Reference 3	See Table 1	0.0	654.4	6.63E+02
Ethyl Benzene	See Table 2	See Table 3	Reference 3	See Table 1	9,977.4	0.0	1.01E+04
Ethyl Chloride	See Table 2	See Table 3	Reference 3	See Table 1	0.0	1,308.7	1.33E+03
Ethylene Glycol	See Table 2	See Table 3	Reference 3	See Table 1	1,392.2	1,090.6	2.52E+03
Hexane	See Table 2	See Table 3	Reference 3	See Table 1	48,031	0.0	4.87E+04
Methyl Chloride	See Table 2	See Table 3	Reference 3	See Table 1	0.0	1,090.6	1.11E+03
Methyl Ethyl Ketone	See Table 2	See Table 3	Reference 3	See Table 1	12,993.0	0.0	1.32E+04
Methyl Isobutyl Ketone	See Table 2	See Table 3	Reference 3	See Table 1	1,392.2	0.0	1.41E+03
Methylene Chloride	See Table 2	See Table 3	Reference 3	See Table 1	0.0	11,996.9	1.22E+04
N,N-Dimethylformamide	See Table 2	See Table 3	Reference 3	See Table 1	1,160.2	0.0	1.18E+03
Toluene	See Table 2	See Table 3	Reference 3	See Table 1	12,065.7	0.0	1.22E+04
Xylenes	See Table 2	See Table 3	Reference 3	See Table 1	6,032.9	0.0	6.12E+03
VOC	See Table 2	See Table 3	Reference 3	See Table 1	232,033.6	218,125	4.56E+05

[a] Includes the United States only
[b] Includes the United States, Puerto Rico, and the U.S. Virgin Islands

<u>Sample Calculation</u>
Calculation for Ethylene Glycol Solvent Based Coatings:

Speciated VOC Emission Factors = (3.87 lb VOC/ gal SB Coatings) x (Weight Fraction VOC, SB Coatings)

= (3.87 lb VOC / gal SB Coatings) x (.006)
= 0.02322 lb ethylene glycol / gal. SB coatings

Emissions = (288,368,698 people) x (0.415 gal SB/person/yr) x (.0232 lb / gal. SB coatings)
= 2,784,403.08 lb ethylene glycol, SB coatings

Calculation for Water Based Coatings:

Speciated VOC Emission Factors = (0.74 lb VOC/ gal WB Coatings) x (Weight Fraction VOC, WB Coatings)
= (0.74 lb VOC / gal WB Coatings) x (.005)
= 0.0037 lb ethylene glycol / gal. WB coatings

Emissions = (288,368,698 people) x (2.0444 gal WB/person/yr) x (.0037 lb / gal. WB coatings)
= 2,181,249.90 lb ethylene glycol, WB coatings

Total emissions = ethylene glycol from SB coatings (lb/year) + ethylene glycol from WB coatings (lb/yr) / 2000 (lb/ton)
= (2,784,403.08 lb + 2,181,249.90 lb) / 2000 lb/ton
= 2,482.83 tons ethylene glycol, from SB and WB architectural surface coatings

References

1. The Current Industrial Report for Paint and Allied Products (MA28F) - 2002. United States Department of Commerce. Bureau of the Census. Issued, July 2003. http://www.census.gov/industry/ma28f99.wks

2. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site. http://eire.census.gov/popest/estimates_dataset.php

3. FR 48848. “National Volatile Organic Compound Emission Standards for Architectural Coatings, Final Rule.” September 11, 1998.

4. Introduction to Area Source Emission Inventory Development. “Volume III: Chapter 3, Architectural Surface Coating.” Prepared by Eastern Research Group for the Emission Inventory Improvement Program Area Source Committee. November 1995.

5.10.4.2 Surface Coating: Wood Furniture (SIC 25)

Maine has performed its own calculations for Surface Coating: Wood Furniture (SIC 25) (SCC: 2401020000) for the 2002 NEI.

Maine 2002 Methodology

Two point sources were used to develop a point source VOC emission/employee number. Using data from two Moosehead Furniture facilities, a local emission factor of 640lb VOC per employee was developed. Maine’s emission factor is the same order of magnitude as the national default of 944 lb

VOC/employee. Seasonal throughput for these facilities is 25% for each quarter. HAP emissions were determined using SPECIATE(3) database profile, no. 2405.

5.10.4.3 Surface Coating: Metal Cans (SIC 341)

There are no point or area sources listed for this source category in Maine, therefore Maine has chosen to delete this category, Surface Coating: Metal Cans (SIC: 341) (SCC: 2401040000), from the 2002 NEI.

5.10.4.4 Surface Coating: Motor Vehicles (SIC 3711)

Maine has performed its own calculations for Surface Coating: Motor Vehicles (SIC 3711) (SCC: 2401070000) for the 2002 NEI.

Maine 2002 Methodology

Although there are no facilities that make new automobiles in Maine, there are several facilities that build or repair specialty vehicles, such as ambulances and race cars. In the 1999 NEI, sources such as these were considered “Other Transportation Equipment.” For the 2002 NEI, emissions from facilities in SIC codes 371 and 3799 are included under this SCC.

Employment data for these SIC codes was obtained from the Tower Publishing, 2003 Maine Manufacturing Directory. (2)

An emissions factor of 15.5 lbs VOC/employee was developed based on the point sources in these SIC codes using the methodology in EIIP(1). This is lower than the national default emission factor of 35 lbs VOC/employee for this category. Since one of the point sources for this SIC code reported activity of 36% during the third quarter, the seasonal activity percentage was obtained by calculating a weighted average. A final seasonal activity emission factor of 25.6% was obtained.

Hazardous air pollutant components were determined using the SPECIATE (3) profile for auto refinishing. The following table indicates the data used to determine the local emission factor and the seasonal activity factor.

Point Source	No. of Employees	Lbs. of VOC	Lbs. of VOC per Employee	3rd Quarter Activity	Lbs. of VOC per Employee – 3rd Qtr
Lemforder	250	49.9	0.2	25%	0.05
Pratt & Whitney	1,610	30,487	18.94	25%	4.73
Fiber Mat	120	133.95	1.12	36%	0.40
Total	1,980	30,670.85	20.26		5.188
Average			**15.49**	**25.6%**	

To determine the seasonal activity, the ozone season activity was divided by 100, then multiplied by the lbs. of VOC per employee. The sum of the weighted activity was taken and divided by the sum of the local emission factors.

Third quarter activity = [(25/100 x 0.2)+(25/100 x 18.94)+(36/100 x 1.12)]/(0.2+18.94+1.12)
= 25.6%

Sample Calculation

Cumberland County
Lbs of VOC = no of employees in Cumberland x 15.5 lbs VOC/employee
Lbs of VOC = 82 x 15.5 lbsVOC/employee = 1271 lbs VOC

Lbs of HAP (toluene) = lbs of VOC *0.1296 lbs toluene/lbs VOC
Lbs of Toluene = 1271 lbs VOC x 0.1296 lbs toluene/lbs VOC = 164.7 lbs toluene = 0.082 tons of tolene

5.10.4.5 Surface Coating: Machinery and Equipment (SIC 35)

Maine has performed its own calculations for Surface Coating: Machinery and Equipment (SIC 35) (SCC: 2401055000) for the 2002 NEI.

Maine 2002 Methodology

Data from two point sources was used to develop a local emission factor. VOC emissions and the number of employees from SCI Systems and Bangor & Aroostook Railroad were used to develop a local emission factor of 40 lbs. of VOC per employee. VOC emissions were estimated for individual area sources using this local emission factor and employment numbers from Tower Publishing.(2)

License allowed emissions were used for Fisher, The Baker Co., and General Electric-Bangor. Actual emissions data reported to the Toxics Inventory was used for Rich Tool and Die instead of the estimated number; the number reported to us was 2000 lbs/year while the estimated number using the local emission factor calculated out to be 4800 lbs/year. Please note Fisher is listed in the point source criteria inventory but they did not report any VOC's. Their licensed VOC limit is 5.1 TPY (calculated using local emission factor 3.28 TPY). The licensed VOC limit was used in the area source calculations.
A seasonal activity of 25.3% was calculated for the 3rd quarter using the activity data from the point sources. HAP emissions were determined using the machinery coating SPECIATE profile.(3)

5.10.4.6 Surface Coating: Auto Refinishing (SIC 7532)

Maine has performed its own calculations for Surface Coating: Auto Refinishing (SIC 7532) (SCC: 2401005000) for the 2002 NEI. However, Maine is also accepting EPA's calculation for lead from this category.

Maine 2002 Methodology

The method used to determine the amount of VOCs emitted from auto body refinishing is found in EIIP, Volume III, Chapter 13, Alternate Method 1, Apportioning National Data with Employment (http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii13_march2005.pdf). The Census Bureau Annual Business Patterns website (http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl) was used to determine a ratio of local to national SIC/NAICS code employment. The National Annual VOC emissions in Table 13.4-1 are based on 1998 and 1999 emissions therefore the total VOC emissions in this table was used (79,429.59 TPY). Total employment by this business segment is 209,140 employees in 1999 and 206,797 employees in 1998 (average of both years of 207969 employees) based on NAICS code 811121. The number of employees in Maine in 2001 for this business sector is 836.

Emissions for Maine were calculated using a ratio below:

tons of VOC = (Tons of VOC nationally x number of employees in autoref. in Maine) / no. of employees in auto body refinishing nationally)
tons of VOC = (79429.6 tpy VOC x 836 employees)/207969 employees = 319.3 tpy VOC from auto body refinishing in Maine).

For many of the counties, only the ranges indicating the number of the employees was given. To determine a number for the counties with ranges, first the mid-points were determined. The total using the new numbers in the ranges was greater than the total the census bureau gave for the state. The ranges were then decreased by the percentage to get the correct total. As a double check, the number for total establishments was checked and adjusted so that the number of employees is in sync with the number of employees per establishment. For instance, Waldo was adjusted to 13 instead of the initial estimate of 7.

Tons per summer weekday was based on 65 days in the third quarter on the assumption that these businesses are not operating during the weekend.

Sample Calculation

Sagadahoc County

			No of est. in range.		
County Name	**Number of Employees**	**Total Establishments**	**1-4**	**5-9**	**10-19**
Sagadahoc, ME	0-19	5	5	0	0

The adjusted number for Sagadahoc come out to be 7.

Tons VOC/yr in Sagadahoc = no. of employees in Maine x 79,429.6 tons of VOC National /207,969 employees nationally in auto-refinishing

Tons VOC/year in Sagadahoc = 7 employees x 79,429.6 tons of VOC/207,969 employees
= 2.7 tpy

2.7 tpy x 25% /65 summer weekdays/quarter = 0.01 tpswd

HAPs calculations:MEK

2.7 tons VOC/yr x 11.6% = 0.31 tons VOC

EPA added a calculation for lead in the 1999 NEI documentation. This is based on population. Maine accepted EPA's calculations for lead for this source category.

5.10.4.7 Surface Coating: Large Appliances (SIC 363)

Maine has performed its own calculations for Surface Coating: Large Appliances (SIC 363) (SCC: 2401060000) for the 2002 NEI using national default emission factors.

Maine 2002 Methodology

There are no point sources for this category and only three area sources in this category according to Tower Publishing.(2) The National Default per Employee Emission Factor of 463 lbs of VOC/employees were used. HAP emissions were determined using the SPECIATE data base, profile no. 2411 for appliance coating.

5.10.4.8 Surface Coating: Miscellaneous Finished Metals (SIC 3479)

Maine has performed its own calculations for Surface Coating: Miscellaneous Finished Metals (SCC: 2401050000) for the 2002 NEI using national default emission factors.

Maine 2002 Methodology

Maine has historically used this category to report emissions from sheet, strip and coil metal working. No point sources were listed in this category so a local emission factor could not be generated. The National Default per Employee Emission Factor of 2,877 lbs of VOC/employees was used.

Employment for this sector was determined using the Tower Publishing Manufacturing Directory. Using this method, the final county estimated emission total seemed high, particularly since many of the businesses listed in this category were engravers. Therefore, the number was compared to the total using the per capita default emission factor. When the results of the two calculation methods were compared, the results were quite similar. Thus, the values using the national default per employee emission factors were kept.

See Table 8.5-2 for the National default emission factors based on per capita in EIIP, volume 10 Chapter 8. HAP emissions were determined using the SPECIATE[3] data base profile no. 2409 for coil coating.

5.10.4.9 Surface Coating: Factory Finished Wood (SIC 2426-9, 243-245, 2493, 2499)

Maine has performed its own calculations for Surface Coating: Factory Finished Wood (SIC 2426 thru 242) (SCC: 240105000) for the 2002 NEI.

Maine 2002 Methodology

This is one of our largest categories. Maine has four OSB plants in this SIC category, which have very high lb VOC/ employee number. These were NOT used for the category local emission factor determination. The remaining point sources were totaled. In addition, three sources (HG Winter, CF Wells and Cornwall), who reported to the Maine DEP toxic emission inventory, were included for determining this emission factor. An average of 221 lb of VOC/employee was derived using these sources. The resulting emission factor is larger than the national default value of 131 lb of VOC/employees. HAP emissions were determined using the SPECIATE[3] data base profile no. 2405.

5.10.4.10 Surface Coating: Electronic and Other Electrical (SIC 3357, 3612)

Maine has performed its own calculations for Surface Coating: Electronic and Other Electrical (SIC 36-363) (SCC: 2401065000) for the 2002 NEI using the national default emission factor.

Maine 2002 Methodology

This category had no major point sources and only three area sources. The national default of 290 lb. VOC/employee was used for the three area sources. HAP emissions were determined using the SPECIATE(3) data base profile no. 2411 for electric insulation coating.

5.10.4.11 Surface Coating: Marine Coatings (SIC 373)

Maine has performed its own calculations for Surface Coating: Marine Coatings (SIC 373) (SCC: 2401080000) for the 2002 NEI.

Maine 2002 Methodology

This is also a large category. Five sources were used to determine the point source emission factor. The three facilities were Bath Iron Work facilities, Old Town Canoe and Sabre Corp. The calculated emission factor was rounded up to 85 lbs of VOC/employee. We had actual emissions or license emissions data for Atlantic Boats, Morris Yatchs and The Hinckley Co. Although Portsmouth Naval Shipyard (PNS) is a point source in this sector, but it was not included in the emission factor calculation because its local emissions factor was very low compared to others in this category (7 lbs of VOC/employee).

5.10.4.12 Surface Coating: Railroad (SIC 374)

Maine has performed its own calculations for Surface Coating: Railroad (SIC 374) (SCC: 2401085000) for the 2002 NEI.

Maine 2002 Methodology

Only one source was listed in this SIC code, Molly Corp. in Ogunquit. Employment from this source was multiplied by 15.5 lbs. VOC per employee (same emission factor as derived in Motor Vehicles). HAP emissions were determined by using the SPECIATE profile for machinery coating.

5.10.4.13 Surface Coating: Aircraft (SIC 372)

Maine has performed its own calculations for Surface Coating: Aircraft (SIC 372) (SCC: 2404075000) for the 2002 NEI.

Maine 2002 Methodology

There were only two sources in this SIC – Skyward Aviation in Auburn and Ashland Machine in Sheridan. Employment from these sources were multiplied by 15.5 lbs. VOC per employee (same emission factor as derived in Motor Vehicles). HAP components were determined using the SPECIATE profile for aircraft coating.

5.10.4.14 Surface Coating: Miscellaneous Manufacturing and Other Special Purpose Coatings

Maine has performed its own calculations for Surface Coating: Miscellaneous Manufacturing (SCC: 2401090000) and for Surface Coating: Other Special Purpose Coatings (SCC: 2101200000) for the 2002 NEI using the national default emission factor.

Maine 2002 Methodology

Miscellaneous Manufacturing and Other Special Purpose Coatings emissions were calculated from a National Default emission factor based on per capita.(4)

A 0.8 lb/person/yr VOC emission factor was used for Other Special Purpose Coatings and 0.6 lb/person/yr for Miscellaneous Manufacturing. The per capita data was obtained from the Census Bureau.

Sample Calculation

Cumberland County

Miscellaneous Manufacturing – VOC emissions in Cumberland County
Lbs VOC = population in county * 0.6 lbs VOC/person
Lbs VOC = 269083 x 0.6 lbs/VOC = 161450 lbs / 2000 lbs/ton = 80.72 tons of VOC

HAP emissions
Toluene emissions estimate using SPECIATE Profile no. 6002 (Industrial Surface Coating operations)

80.72 lbs VOC x .147 lb toluene / lb VOC = 11.87 tons

Sample Calculation

Other Special Purpose Coatings – VOC emissions in Cumberland County
Lbs VOC = population in county * 0.8 lbs VOC/person
Lbs VOC = 269083 x 0.8 lbs/VOC = 215266 lbs / 2000 lbs/ton = 107.63 tons of VOC

VOC emissions were reduced an additional 20% per a John Sietz memo indicating that Maine could take credit for VOC implementation rules.
Lbs VOC = 107.63 tons * 0.8 = 86.11 tons

HAP emissions - toluene
Toluene emissions estimate using SPECIATE Profile no. 6002 (Industrial Surface Coating operations)

107.63 lbs VOC x .147 lb toluene / lb VOC = 15.82 tons

References for Sections 5.10.4.2 through 5.10.4.14

1. Emission Inventory Improvement Program (EIIP) Volume III Chapter 8 http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii08.pdf

2. Tower Publishing – Maine Manufacturing Directory 2003

3. SPECIATE http://www.epa.gov/ttnchie1/software/speciate/index.html

4. US Census Bureau; Population Estimates. http://eire.census.gov/popest/data/counties/tables/CO-EST2002/CO-EST2002-01-23.php

5.10.4.15 Surface Coating: Traffic Markings

Maine has performed its own calculations for Surface Coating: Traffic Markings (SCC: 2401008000) for the 2002 NEI using the national default emission factor.

Maine 2002 Methodology

The method used to determine the amount of VOC emissions from this source category is found in EIIP, Volume III, Chapter 14, Alternative Method 5.1.1.

The 2002 US paint sales for Traffic Markings were obtained from the US Census Bureau, Report for Paint and Allied Products. Traffic marking paint sales totaled 39,397,000 gallons in 2002. According to the Federal Highway Administration's annual "Highway Statistics" report, Table HF-2, total disbursements on roads and highways was $116,004,675,000 of which Maine spent $643,286,000. The 2002 report has not been published yet, therefore the 1999 report was used. Gallons of traffic paint are apportioned from the national level using a ratio of Maine highway spending to national highway spending, resulting in 195,801 gallons used by the state of Maine.

The traffic paint was apportioned using paved lane miles in each county, as obtained from the Maine DOT. Since there was no information about the proportions of solvent-based paints used in Maine, the national average of 3.36 lb/gal was used. Using the SPECIATE profile database, the totals were corrected for 4% acetone. EPA guidance in the 22 March 1995 memo from John S. Seitz, Director of Air Quality Planning & Standards, states that it will be acceptable to claim a 20% reduction to the four allowed coating categories: Architectural Coatings, Traffic Markings, High Performance Maintenance Coating, and other special purpose coatings. This category has a 20% control effectiveness. Therefore, the total VOC amount was reduced by 24% to account for acetone and control effectiveness. The seasonal activity for the ozone season is 33 percent of annual activity. Traffic marking application takes place 5 days per week during the active season.

Sample Calculations

US Paint Sales for 2002 = 39,397,000 gallons
Total $ spent in US on road maintenance (2000) = $116,004,675,000
Amount $ spent in state Maine for maintenance (2000) = $643,286,000
Cumberland paved lane miles = 4458.83
State total of lane paved miles = 37,429
Maine traffic paint usage in gallons = 39397000 gal. X ($643286000/$116004675000)
= 218470 gallons

Cumberland county traffic paint usage = 218470 gallons x 4458.83 / 37481
= 26026 gallons

Conversion to tpswd of VOC's for Cumberland = 26026 gallons x 3.36 lbs VOC/gallon
= 87447 lbs. VOC

87447 lbs VOC/2000 lbs/ton = 43.7 of VOC x 0.76
= 33.2 tons of VOC

33.2 tons VOC x 0.33 seasonal activity / 65 days in ozone season
= 0.17 tons per summer weekday.

*data for Federal Highway Administration's annual Highway Statistics report for 2002 not available yet

The amount of HAPs emitted is based on a speciate profile of VOC's. HAPs are speciated as follows:

HAPs emissions	Percent of VOC
Methyl Ethyl Ketone	5.77
Toluene	47.92
1,1,1-trichlorethane	9.38
Isomers of xylene	0.69

5.10.4.16 Surface Coating: Industrial Maintenance Coatings

Maine has performed its own calculations for Surface Coating: Industrial Maintenance Coatings (SCC: 2401100000) for the 2002 NEI.

Maine 2002 Methodology

Industrial maintenance coatings are high performance architectural coatings, including primers, sealers, under-coaters, intermediate coats, and topcoats formulated and recommended for application to substrates exposed to extreme environmental conditions in industrial, commercial, or institutional settings. 1999 emissions from the use of industrial maintenance coatings were estimated for thirteen pollutants by multiplying emission factors developed from 1996 and 1998 data provided by CARB (1,2) and 1999 coating sales data(3).

Emissions were allocated to the county-level by the county proportion of national employment as reported to the 1999 County Business Patterns(4) for numerous SIC codes related to industrial sources.

Sample calculation is based on the methodology presented the "Documetation for the final 1999 Nonpoint area source National Emission Inventory for Hazardous Air Pollutants (version 3)".
Sample Calculation

Cumberland County

Total gallons sold was obtained from the total gallons shipped in US using product codes 3255107111 and 3255107115 (57,577,000 gallons).

Lbs of VOC from Water based coatings (WBC) = total US gallons/ total US population * Pop. In Cumberland county *%WBC sold *lbs VOC/gallon WBC

Lbs of VOC from WBC = 57,577,000 gal / 287,941,220 x 269,083 x 0.09 x 0.7 lbVOC/gal = 3,390

Lbs of VOC from solvent based coatings (SBC) = total US gallons/ total US population * Pop. In Cumberland county *%SBC sold *lbs VOC/gallon SBC

Lbs of VOC SBC = 57,577,000 gal / 287,941,220 x 269,083 x 0.91 x 2.6 lbs VOC/gal = 127,305

Methanol calculation:
Tons of methanol = 0.0429 lbs Methanol from WBC/lbs VOC * lbs WBC VOC Cumberland + 0.0151 lbs Methanol from SBC/lbs VOC * lbs SBC VOC Cumberland

Tons of methanol = total lbs methanol / 2000 lbs/ton

Tons of methanol = 0.0429 x 3,390 + 0.0151 x 127,305 = 2,067 lbs = 1.03 tons

References

1. CARB. "1998 Architectural Coatings Survey Results". Final Report. California Environmental Protection Agency. Air Resources Board. September 1999. Pp. 86, 97&98.

2. CARB. "Improvement of Speciation Profiles for Architectural and Industrial Maintenance Operations". Final Report. California Environmental Protection Agency. Air Resources Board Research Division. June 1996. Pp. 90, 138 - 140.

3. U.S Census Bureau. "The Current Indsutrial Report for Paint and Allied Products (MA28F) - 1999". United States Department of Commerce. Bureau of the Census. Issued, 2000. www.census.gov/industry/ma28f99.wks

4. County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2, 2001

5.11 WASTE MANAGEMENT

5.11.1 Leaking Underground Storage Tanks

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating emission estimates from the category (SCC: 2660000000) based on 2002 activity data.

Methodology

Emission estimates from leaking underground storage tanks (UST) are derived through determining the VOC emissions and speciating the fraction of HAPs (Hazardous Air Pollutants). Maine DEP calculated total county emissions using the VOC emission factor of 28 lbs. VOCs per event[97], as provided by EPA . Using SPECIATE profile 1100[98], gasoline refueling, the HAP percentage of VOCs were utilized to estimate emissions.

Pollutant	VOC percentage
Benzene	1.00%
Hexane	0.90%
2,2,4-Trimethylpentane	0.37%
P-Xylene	0.29%
Ethylbenzene	0.28%

Source: SPECIATE profile #1100 gasoline refueling

Sample Calculation

2002 County Remediations X 28 lbs. VOCs per event per event / 2000 pounds = Tons VOCs
Tons VOCs / 365 = VOCs tpswd
Tons VOCs X HAPs % = Tons HAPs

Cumberland County

VOCs

22 Remediations x 28 lbs. VOCs = 616 lbs. VOCs

616 lbs. VOCs / 2,000 tons per Lbs. = 0.31 Tons VOCs per year.

0.31 Tons VOCs per year / 365 days per year x = 0.0084 tpswd

HAP: Benzene

0.31 Tons VOCs per year X 1.00% = 0.003 Tons

[97] EPA, EIIP Volume III, Area Source Category Method Abstract – Remediation of Leaking Underground Storage Tanks, page 5 & 7, May 2001

[98] EPA, SPECIATE version 3.2 database, Profile 1100, Gasoline Refueling.

5.11.2 Catastrophic and Accidental Releases

5.11.2.1 All Catastrophic and Accidental Releases: Total

Maine DEP has learned that U.S. EPA is using All Catastrophic and Accidental Releases: Total (SCC: 2830000000) to report emissions from an exceptional event. A tire fire occurred in Greene (Androscoggin County) in late June, 2002. According to Greene Fire Chief Bruce Tufts, there were 3,000 discarded tires in the pile and about 2,250 of them burned.

Maine DEP is accepting these emission estimates as presented by EPA. Unfortunately, additional data from EPA has required Maine DEP to change its reporting of transportation accidents to a different SCC for the 2002 NEI.

References

1. Portsmouth Herald Online, http://www.seacoastonline.com/2002news/07012002/maine/12041.htm.

5.11.2.2 Transportation Accidents

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is providing emission estimates for Catastrophic and Accidental Releases: Transportation Accidents (SCC: 2830010000) for the 2002 NEI. In previous national inventories, these emissions were reported under Catastrophic and Accidental Releases: Total (SCC: 2830000000).

Transportation accidents involve petroleum spills from oil-tanker accidents, tanker-truck accidents, and blowouts from rigs or pipelines. The nature and quantity of emissions from oil spills can be highly variable; emissions may also be influenced by the clean up procedure or by dispersion and weathering processes. Evaporation of spills causes local VOC emissions. If spills catch fire, additional SO_2, CO, CO_2, PM, NO_X, and VOC emissions may result.

Maine 1999 Methodology

The Air Bureau has assumed that all material spilled was released as VOCs. Additionally, a constant density of 6.54 lbs/gal spilled was assumed. This relates to the average density of the petroleum materials shipped into state which carry a likelihood of spillage. Using these assumptions with data from the Bureau of Oil and Hazardous Waste's Response Division, VOC emissions were estimated. This activity was assumed to be spread evenly throughout the year, as accidents are not generally restricted to any one season.

Sample Calculation

Total Petroleum Spilled x % Population in County = Petroleum Spilled in County
Petroleum Spilled in County x Density x % Volatility = County VOC Emissions
Total Petroleum Spilled x % Population in County = Petroleum Spilled in County
Petroleum Spilled in County x Density x % Volatility = County VOC Emissions

Example: Cumberland County
112,267.47 gallons x 21% = 23,272.97 gallons
23,272.97 gallons x 100% x 6.54 lbs. /gallon x 1 ton /2,000 lbs. = 76.10 tons
Tons per summer weekday = 76.10 tons /364 days = 0.21 tpswd.

5.11.2.3 Catastrophic Releases of Hazardous Materials

Catastrophic releases of hazardous materials other than petroleum products make up this category of emissions. Chemical spills from rail car, tank-truck, or industrial accidents may happen with or without combustion, so the emissions depend upon the nature and quantity of material(s) released. However, if combustion occurs, VOC, NOx, CO, and air toxics releases, may result. Very little information was found for this category, consequently emissions were not evaluated.

5.11.3 Cremation: Animal

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating emission estimates for Animal Cremation (SCC: 2660000000) based on 1999 emission estimates.

Methodology

To determine the 2002 emissions for animal cremations the ratio of human population change from 1999 to 2002 was applied to the 1999 data.

Sample Calculation

Cumberland County 1999 Animal cremation is 19.69 tons
Cumberland County 1999 population is 263,364
Cumberland County 2002 population is 269,083
Ratio increase is 102%

So
19.69 tons x 102% = 20.11 tons animal cremations for 2002.

Emissions calculations:

Pollutant	Emission factor	Units	Emissions for Cumberland County (pounds)
Arsenic	4.00E-04	lbs/ton	8.05E-03
Beryllium	1.84E-05	lbs/ton	3.70E-04
Cadmium	1.46E-03	lbs/ton	2.94E-02
Chromium	3.99E-04	lbs/ton	8.03E-03
Dibenzofurans	1.43E-07	lbs/ton	2.88E-06
Formaldehyde	2.89E-09	lbs/ton	5.81E-08
Hydrogen Chloride	1.97	lbs/ton	3.96E+01
Lead	9.39E-03	lbs/ton	1.89E-01
Nickel	5.09E-04	lbs/ton	1.02E-02
7-PAH	1.03E-09	lbs/ton	2.07E-08
16-PAH	9.63E-04	lbs/ton	1.94E-02

Source: AnimalCremations 2002.xls

5.11.4 Cremation: Human

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating emission estimates for Human Cremation (SCC: 2810060100) based on 2002 activity data.

Methodology

To determine the 2002 emissions for human cremations the number of bodies was multiplied by 150 pounds per body to give the tons of bodies cremated in a county which was applied to the 1999 NEI emission factors.

Sample Calculation

Cumberland County 1,950 bodies cremated in 2002 x 150 pounds per body = 1,463 tons of bodies cremated in 2002.

Emissions calculations:

Pollutant	Emission factor	Units	Emissions for Cumberland County (tons)
Arsenic	4.00E-04	lbs/ton	2.93E-04
Beryllium	1.84E-05	lbs/ton	1.35E-05
Cadmium	1.46E-03	lbs/ton	1.07E+03
Chromium	3.99E-04	lbs/ton	2.92E-04
Dioxins, Total (non-TEQ)	7.74E-08	lbs/ton	5.66E-08
Formaldehyde	2.89E-09	lbs/ton	2.11E-09
Furans, (Dibenzofurans)	1.43E-07	lbs/ton	1.05E-07
Hydrogen Chloride	1.97	lbs/ton	1.44E+00
Lead	9.39E-03	lbs/ton	6.89E-03
Mercury	5.31E-03	lbs/ton	3.88E-03
Nickel	5.09E-04	lbs/ton	3.72E-04
7-PAH	1.03E-09	lbs/ton	7.53E-11
16-PAH	9.63E-04	lbs/ton	7.04E-04

Source: Human Cremations 2002(3).xls

5.11.5 Composting

Maine DEP contact: David Wright (207)287-2437 or David.W.Wright@Maine.gov

Maine is providing MANE-VU developed emission estimates of ammonia from composting.

Areas for Improvement

Maine DEP's Solid Waste Program and the Department of agriculture have extensive data on volumes of organic residuals that are being composted, land-applied, and landfilled. They also have extensive information on ammonia release from these operations. This information could be tapped in the future to gain an accurate understanding of ammonia releases from composting, and other source categories.

5.11.6 Drum Reconditioning

Maine will no longer be including emissions from drum and barrel reclamation in its inventory.

Reconditioning of drums is the rinsing of empty 55 or 30-gallon drums that contained volatile chemicals. The emissions from this source category in Maine are zero, since there is zero activity data. In July of 2003, Maine DEP confirmed (Douglas Saball) with the Maine DEP Hazardous Waste Facility section

(Stacy Ladner and Michael Hudson) in the Bureau of Remediation and Waste Management that no facilities recondition drums in the state of Maine. Maine DEP also contacted Clean Harbors (Ray Babbage) and Land Reclamation (Keith Heldenbrandt), the two facilities identified by Maine DEP that sell reconditioned drums. Neither knew of anyone that reclaims or reconditions drums in Maine. Both facilities obtain their drums from out of state.

5.11.7 Fluorescent Lamp Breakage

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine is updating the emission estimates of mercury due to Lamp Breakage (SCC: 2861000000) for the 2002 NEI.

Methodology

The 2002 mercury emissions for Lamp Breakage attributed to Maine was derived from apportioning total national emissions in the 1999 NEI to Maine based on population:

Key 1999 EPA NEI Assumptions:
17 Tons mercury in Lamps sent to landfills in US.
6.6 percent of mercury in all lamps sent to landfills
Resulting in 1.122 Tons mercury emitted nationally in 1999 for Lamp Breakage.

National population for 2002 = 287,973,924
Maine's population for 2002 = 1,294,464
Or 2.22% of the National Population

Thus: 1.122 Tons mercury nationally x 2.2% = $2.50E^{-2}$ Tons for Maine in 2002.

Controls: In 2002 Maine collected 360,000 lamps for recycling at an out of state facility resulting in removing 0.72 tons (1,440 lbs.) from the waste stream. These lamps would have otherwise been broken at an instate solid waste facility. Maine DEP estimates that this recycling program reduced emission from this source category by 65%.[99] Therefore, the 2002 net Maine release from lamp breakage, after applying 65% reductions from recycling, was estimated to be 1.62 E-2 tons. County emissions were apportioned based upon population.

Sample Calculation

State of Maine 2002 population is 1,294,464
Cumberland County 2002 population is 269,083 or 20.79%

So $2.50E^{-2}$ Tons for mercury Maine in 2002 x 20.79% = $5.19E^{-3}$ Tons of mercury from Lamp Breakage for Cumberland County in 2002.

$5.19E^{-3}$ Tons of mercury from Lamp Breakage for Cumberland County in 2002 x 65% recycling control = $3.37E^{-3}$ Tons of mercury from Lamp Breakage for Cumberland County in 2002.

[99] email from Kevin Jensen, MAINE DEP Hazardous Waste Program, to Doug Saball, MAINE DEP Inventory Program, Received Thur 4/29/2004 10:03 AM.

5.11.8 Fluorescent Lamp Recycling

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Emissions from Fluorescent Lamp Recycling (SCC: 31301200) in Maine are zero.

According to the description of crushing fluorescent lamps to reclaim mercury as described in section 5.3.5.2.1 of the document "Locating and Estimating Air Emissions from Sources of Mercury and Mercury Compounds.[100]" That is cited in the EPA, "Documentation for the 2002 Non-Point Source National Emission Inventory for Criteria and Hazardous Air Pollutants (Jan. 2004 Version)."[101] This process is not performed in Maine.

5.11.9 Landfills

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine is providing emission estimates for Landfills (SCC: 2620000000) for the 2002 NEI.

Methodology

Landfill emissions were calculated using the State Planning Office Solid Waste Report (http://www.state.me.us/spo/recycle/municipaldata/) and the Maine DEP, Bureau of Remediation's Active landfill reports (http://www.state.me.us/dep/rwm/data/landfillactive.htm). Capacity and estimated life were used to determine yearly acceptance rate required by the LandGEM program.

LandGEM (http://www.epa.gov/oar/oaqps/landfill.html) requires the following parameters: (a) year landfill opened, (b) current year, (c) capacity in Megagrams (Mg) and (d) yearly acceptance rates. This data is used to generate individual pollutant data. Yearly acceptance rate was calculated using the capacity of the landfill divided by the estimated life of the landfill. Since LandGEM only generates data one pollutant at a time, it was discovered that the HAP results can be ratioed so that the entire HAP suite can be calculated by obtaining the NMOC number. (NMOC = non methance organic compound). When running the model LandGEM allows you to choose what parameters to use to determine the emissions, i.e., CAA, AP-42 or custom. AP-42 was used as recommended by EIIP – Chapter 15. http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii15_apr2001.pdf

Sample Calculations

The units for the LandGEM model is in Megagrams, therefore, it was necessary to convert from Tons and cubic yards to Megagrams using the following conversations and calculations:

Tons/year x 2000lbs/ton x 453.6grams/lb x Megagram/1000000 grams = Mg/year
OR TONS/YEAR X 0.9072 MEGAGRAMS/TON = MEGAGRAMS/YEAR

Cubic yards x 1160 lb/cubic yard x 453.6 grams/lb x megagram / 10^6 grams = Mg

The following is an example calculation used for determining VOC emissions from the Tri- Community Landfill in Fort Fairfield.

[100] U.S. Environmental Protection Agency, "Locating and Estimating Air Emissions from Sources of Mercury and Mercury Compounds." EPA-454/R-97-012, Section 5.3.5.2.1, Page 5-18, December 1997.
[101] U.S. Environmental Protection Agency, "Documentation for the 2002 Non-Point Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version), EPA Contract No. 68-D-02-063, Work Assignment Nos. 2-02, 2-07, and 2-11, March 2004.

(a) Year Landfill Opened:1977
(b) Current Year: 1999
(c) Capacity in Mg: 1,176,000 cubic yards x 1160 lbs/yd^3 x 453.6 grams/lb x megagrams/10^6 grams = 618783 Mg
(d) Yearly waste acceptance rate = 618783 Megagrams /30 years = 20626 megagrams/year
(e) Estimated landfill life: 8 yrs (from 1999)
(f) Total life of the landfill = (8 yrs + (1999-1977) = 30 years

Entering the capacity, current year, year opened and the acceptance rate, the model generates NMOC Mg/year values for each year. Clean Air Act default values were used in the model. (Clean Air Act or AP-42 default values can be chosen.) For this application EIIP recommended to use CAA default values.

The NMOC value for 1999 for the Fort Fairfield Landfill is 5.25 Megagram/yr x 1000000grams/Megagram x lbs/453.6 grams x tons/2000lbs = 5.79 tons per year. This was then converted to tpswd;
5.79 tpy/4 quarters per year / 91 days per summer season = 0.0159 tpswd

Since the percent VOC of the NMOC can vary it was decided to use the entire NMOC value. For landfills with no licensed volume listed, the number was generated assuming the tons received in 1999 was the same for each year then back calculating the volume.

Another example is the Bath Landfill. It was opened in 1982 and has 10 years remaining, therefore (2009-1982)= 27 years total life. 24273 tons/year is the waste acceptance rate for 1999.
27 years x 24273 tons/year = 655371 tons of landfill capacity (594552 Mg).

The same methodology was used for the 2002 NEI.

Note: When converting from cubic yards to MG, a factor of 1160 lbs/cubic yard was used. The large industrial and commercial landfills were NOT included in this because these landfills should be reporting to the annual criteria inventory for point sources, per chapter 137. Additionally, many of these landfills have controls such as flares that would not taken into account by LandGEM.

The landfills not included are as follows:

Fraser Paper, Ltd.
Irving Forest Products, Inc
J. Paul Levesque & Sons, Inc.
Regional Waste Sys.
International Paper Company
American Tissue Company
Mead Oxford Corp (formerly Boise)
G.N.P., Inc.
Fort James, Inc.
S.D. Warren Co.
Georgia Pacific
IP - Bucksport formerly Champion

In addition Maine's two commercial solid waste landfills, Pine Tree Landfill (formerly Sawyers) and Consolidated Waste Landfill in Norridgewock, were not included.

Areas of improvement

EPA worked with a contractor (Chartwell) to develop landfill emission numbers for Maine landfills. The numbers generated were in the same order of magnitude as the emissions Maine generated except for chloroform, mercury, toluene and benzene. In an email sent on January 28, 2005, to Lisa Higgins, from Rebecca Kurowski, recommended that we use AP-42 emission factors instead of Landgem and that the differences in emissions was probably due to changes in the AP-42 factors.

5.11.10 Publicly-Owned Treatment Works (POTWs)

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine accepts the methodology approach for Publicly-Owned Treatment Works (SCC: 2630020000) for VOC and HAPs used by EPA.

A comparison of the VOC emissions that EPA generated for 2002 NEI versus the VOC emissions generated by Maine are comparable for 1999. See the table below

Comparison between EPA and State data generated for POTW's

SIC 2630020000

County	Tons VOC EPA - 2002	Tons VOC State - 1999
Androscoggin	23.4	28.2
Aroostook	16.3	19.9
Cumberland	60.1	75.4
Franklin	6.6	2.6
Hancock	11.7	6.8
Kennebec	26.4	42.5
Knox	9.0	8.7
Lincoln	7.7	3.0
Oxford	12.4	3.6
Penobscot	32.6	44.2
Piscataquis	3.8	3.3
Sagadahoc	8.0	6.2
Somerset	11.4	21.7
Waldo	8.4	2.1
Washington	7.5	4.9
York	43.7	54.2
Total	289.2	327.2

Maine used the maximum plant throughput to estimate VOCs from POTW's since the average and seasonal flow information is not readily available.

EPA 2002 Methodology

Descriptions of methodology as presented in Appendix A of the “Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version)”.

Publicly owned treatment works (POTW) facilities are owned by a municipality, state, an intermunicipal or interstate agency, and departments/agencies of the federal government. The definition of a POTW facility includes intercepting sewers, outfall sewers, sewage collection systems, pumping, power, and other equipment. The wastewater treated by these POTWs is generated by industrial, commercial, and domestic sources.(1) The national emission estimates for POTW facilities were calculated using an interpolated nationwide flow rate for base year 2002, and then applying emission factors for VOCs, ammonia, and 53 HAPs. Nationwide projected flow rates for 2000 and 2005 were available from an EPA report(2), and are summarized in Table 5.11.10-A. In 2000, flow rate was estimated to be 34,710 million gallons per day (MMGD); in 2005, flow rate was estimated to be 37,085 MMGD. The interpolated 2002 nationwide flow rate (using a linear regression) was calculated at 35,660 MMGD, or 13,015,900 million gallons annually.

The ammonia emission factor was obtained from a report to EPA , while the VOC emission factor was retrieved from FIRE program.(4) Emission factors for the 53 HAPs were derived using 1996 area source emissions estimates that were provided by ESD(5) and the 1996 nationwide flow rate.(6) Table 5.11.10-B lists the 53 HAPs, the 1996 area source emissions, and the derived emission factor in pounds per million gallons treated. It was assumed that the emission factors derived from the 1996 information are applicable for the year 2002. Emissions were allocated to the county level by the county proportion of the U.S. population.(7) Appendix B contains the total population data in database format.

It is important to note that the emission estimates for this category represent total emissions. When the 2002 point source NEI is released, it will be necessary to determine whether there are point source emissions in SCCs 50100701 through 50100781 and 50100791 through 50182599 that will need to be subtracted to yield the nonpoint source emission estimates for this category.

The national POTW flow rate estimate does not include Puerto Rico or the U.S. Virgin Islands. Emissions for Puerto Rico and the U.S. Virgin Islands were estimated using the approach outlined in the report text. Broward County in Florida is assumed to be the surrogate county for Puerto Rico. Monroe County in Florida is assumed to be the surrogate for the U.S. Virgin Islands. POTW emissions in the surrogate counties were divided by the population of the surrogate counties obtained from the U.S. Census Bureau to estimate emissions on a per capita basis.(7) The per capita emissions were then multiplied by the population in each county of Puerto Rico and the U.S. Virgin Islands to estimate emissions. The emissions data reported in Table 5.11.10-B include the emission estimates for Puerto Rico and the U.S. Virgin Islands.

Sample Calculation

The 1996 flow rate per day was 32,175 MMGD. (1996 was a leap year.) Annually, this computes to:

32,175 MMGD treated * 366 days = 11,776,050 million gallons treated

Benzene emissions in 1996 for area source POTWs were estimated to be 461.44 tons per year. The derived benzene emission factor is calculated as follows:

Benzene emission factor = (461.44 tons * 2000 lb/ton)/(11,776,050 million gallons treated)

Benzene emission factor = 0.078369 lb/million gallons treated

Benzene estimates for 2002 for area source POTWs (exluding Puerto Rico and U.S. Virgin Islands) are calculated asfollows:

2002 Benzene emissions = (35,660 MMGD * 365 days) * (0.078369 lb/million gallons treated)
202 Benzene emissions = 1,020,043 pounds = 510.02 tons/year

Table 5.11.10-A: National Flow Rates, 1996-2005

Year	Flow rate (MMGD)	Reference
1996	32,175	6
2000	34,710	2
2002	35,660	interpolated by linear regression
2005	37,085	2

Table 5.11.10-B: Emission Factors and National-Level Estimates

Pollutant	1996 Emissions (tpy)	Derived Emission Factor (lb/MMGAL)	2002 Emissions (tpy)(1)
1,1,2,2-Tetrachloroethane	0.12	2.0380E-05	0.1335
1,1,2-Trichloroethane	0.08	1.3587E-05	0.0890
1,2,4-Trichlorobenzene	5.92	1.0054E-03	6.5839
1,3-Butadiene	1.72	2.9212E-04	1.9129
1,4-Dichlorobenzene	14.76	2.5068E-03	16.4152
1-Chloro-2,3-Epoxypropane	0.31	5.2649E-05	0.3448
2,4-Dinitrotoluene	3.3	5.6046E-04	3.6701
2-Nitropropane	0.02	3.3967E-06	0.0222
Acetaldehyde	21.27	3.6124E-03	23.6552
Acetonitrile	23.67	4.0200E-03	26.3244
Acrolein	26.3	4.4667E-03	29.2493
Acrylonitrile	26.47	4.4956E-03	29.4384
Allyl Chloride	1.33	2.2588E-04	1.4791
Ammonia	NA	1.90E+01[2]	124,417.9275
Benzene	461.44	7.8369E-02	513.1862
Benzyl Chloride	0.56	9.5108E-05	0.6228
Biphenyl	5.16	8.7636E-04	5.7386
Carbon Disulfide	296.41	5.0341E-02	329.6496
Carbon Tetrachloride	77.35	1.3137E-02	86.0241
Chlorobenzene	33.13	5.6267E-03	36.8452
Chloroform	441.89	7.5049E-02	491.4438
Chloroprene	1.63	2.7683E-04	1.8128
Cresols (includes o,m,p)	0.11	1.8682E-05	0.1223
Dimethyl Sulfate	0.09	1.5285E-05	0.1001
Ethyl Acrylate	0.12	2.0380E-05	0.1335
Ethyl benzene	525.48	8.9246E-02	584.4077
Ethylene Oxide	15.22	2.5849E-03	16.9268
Formaldehyde	1.35	2.2928E-04	1.5014
Glycol Ethers	788.86	1.3398E-01	877.3233
Hexachlorobutadiene	0.05	8.4918E-06	0.0556
Hexachlorocyclopentadiene	0.04	6.7935E-06	0.0445
Methanol	782.48	1.3289E-01	870.2278
Methyl Chloroform (1,1,1-Trichloroethane)	38.62	6.5591E-03	42.9509
Methyl Ethyl Ketone (2-Butanone)	195.16	3.3145E-02	217.0454
Methyl Isobutyl Ketone (Hexone)	184.45	3.1326E-02	205.1343

Pollutant	1996 Emissions (tpy)	Derived Emission Factor (lb/MMGAL)	2002 Emissions (tpy)(1)
Methyl Methacrylate	21.31	3.6192E-03	23.6997
Methyl tert-Butyl Ether	4.37	7.4218E-04	4.8601
Methylene Chloride	625.92	1.0630E-01	696.1111
N,N-Dimethylaniline	22.10	3.7534E-03	24.5783
Naphthalene	90.00	1.5285E-02	100.0927
Nitrobenzene	0.45	7.6426E-05	0.5005
o-Toluidine	0.12	2.0380E-05	0.1335
P-Dioxane	1.23	2.0890E-04	1.3679
Propionaldehyde	0.24	4.0761E-05	0.2669
Propylene Dichloride	0.79	1.3417E-04	0.8786
Propylene Oxide	50.21	8.5275E-03	55.8406
Styrene	187.35	3.1819E-02	208.3596
Tetrachloroethylene	292.47	4.9672E-02	325.2678
Toluene	839.51	1.4258E-01	933.6532
Trichloroethylene	20.98	3.5632E-03	23.3327
Vinyl Acetate	5.25	8.9164E-04	5.8387
Vinyl Chloride	0.46	7.8125E-05	0.5116
Vinylidene Chloride	29.01	4.9269E-03	32.2632
VOC	NA	9.90E+00[2]	64,828.2886
Xylenes (includes o, m, and p)	4100.05	6.9634E-01	4,559.8322

1 Includes estimates for Puerto Rico and the U.S. Virgin Islands.
2 Actual emission factor, not derived

References

1. U.S. Environmental Protection Agency. 64FR57572. National Emission Standards for Publicly Owned Treatment Works, Final Rule. 40 CFR Part 63. October 26, 1999.

2. U.S. Environmental Protection Agency. Biosolids Generation, Use, and Disposal in The United States. EPA530-R-99-009. September, 1999. Table A-8.

3. Battye, R. et al. “Development of Ammonia Emission Factors.” EC/R. August, 1994. (Internet address: http://207.158.206.57/docs/Battye_Report.pdf)

4. U.S. Environmental Protection Agency. Factor Information Retrieval (FIRE) program. Version 6.23.

5. Memorandum from Bob Lucas, EPA to Greg Nizich, U.S. Environmental Protection Agency. “Review of Baseline Emissions Inventory.” October 16, 1998.

6. U.S. Environmental Protection Agency. “Facilities Database (Needs Survey) - Frequently Asked Questions.” Internet address: www.epa.gov/oqm/faqwfd.htm. June 28, 2001.

7. U.S. Census Bureau. *7/1/2002 County Population Estimates File and Components of Change,* [Data file], April 17, 2003. Available from Population Estimates Branch Web site http://eire.census.gov/popest/estimates_dataset.php.

5.11.11 Industrial Treatment Works

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine accepts the methodology approach for Industrial Treatment Works (SCC: 2630010000) for VOC and HAPs used by EPA.

Methodology

Sources from this category were obtained from the "NON-POTW WASTE DISCHARGE LICENSES AS OF DECEMBER 31, 2003" report published by the State of Maine Water Bureau.
(http://www.state.me.us/dep/blwq/docstand/wd/nonpotws.pdf)

This source category includes ALL sources that are not discharging to a POTW, except sources that only discharge non-contact cooling water. These sources include food processors, such as blueberry and seafood, industrial plants, such as pulp and paper and textile mills, and campgrounds which have seasonal discharges only. There are several quality assurance issues with this category.

Discharge facilities were split into two categories. POTW-like facilities and "true" industrial facilities. The POTW-like facilities include campgrounds, food processing facilities, ski resorts; while the "true" industrial facilities are known industrial facilities, such as pulp and paper mills and tanneries. The Water Bureau provided us with a file that can run a discharge report for each facility. Since running this report for each facility is time consuming, this report was run for the major dischargers. The actual flow was compared to their licensed flow. This ratio was used on the small discharge to estimate "actual" their flow.

The discharge flow was multiplied by 9.9 lbs VOC/MMGAL for POTW-like facilities and 110 lbs VOC for industrial discharge plants. 110 lbs VOC/MMGAL for industrial dischargers (per memo from Bob McConnell dated April 13, 2004). For HAP emissions, the major dischargers report to our Toxics emission inventory. For the POTW-like dischargers, the POTW emission factors obtained from Appendix A of the "Documentation for the 2002 Nonpoint Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version)" was used. The link for this document is:
(ftp://ftp.epa.gov/pub/EmisInventory/prelim2002nei/nonpoint/documentation/2002prelimneinonpt_032004.pdf)

Sample Calculation

Oxford County

Licensee	Town	Licensed Discharge (MGD)	Actual Discharge (MGD)	Lbs VOC/MM GAL	Op. Days per Year	TPY	Comment
Wyonegonic Camps	Denmark	0.007	*0.0037	9.9	183	0.003	Commercial campground seasonal
Robinson Manufacturing	Oxford	0.5	*0.266	110	365	5.34	Textile mill
Mead Oxford Corp	Rumford	37	29.98	110	365	601.8	Kraft pulp & Paper mill

*estimated flow

Total VOC = (29.98+.266) MG/day x 365 days/yr x 110 lb VOC/MG + 0.0037 MG/day of seasonal flow x 183 days x 9.9 = 1214367 lbs VOC/yr

Tons VOC tpy = 1214367 lbs VOC/yr /2000 lbs/ton = 607.18 VOC tpy

tpswd = 607.18 tpy / 365 day/year = 1.6635 tpswd

5.11.12 Hazardous Waste Transfer, Storage, and Disposal Facilities

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine DEP is discontinuing calculating emissions from Hazardous Waste Transfer, Storage, and Disposal Facilities (SCC: 2640000000).

There are very few facilities in Maine in the Transfer, Storage and Disposal of Hazardous Waste source category. Consequently, Maine DEP's recalculation of emissions from this source category for 2002 determined that emissions from this source category were negligible, even considering the three Maine facilities that handle the largest number of containers. The emission factor for this category is based on the number of containers handled at a facility, and was obtained from EIIP Volume II, Chapter 14 A-257 and can be found at the following link.
http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii14_july2001.pdf

According to the DEP's Hazardous Waste Licensing Program in the Bureau of Remediation and Waste Management, there are no Hazardous Waste disposal facillities in Maine. Maine has three facilities that are licensed to store a large volume of drums: Portsmouth Naval Shipyard, Enpro, and Cleanharbors. As it turns out Clean harbors does not store drums for long periods of time; all waste oil is transferred into a receiving storage tank.

Maine DEP conducted bounding calculations for VOC emissions from this source category. Even assuming that the entire hazardous waste volume Clean Harbors is licensed to process is in 55 gallons drums and is stored for a year, VOC emissions were only 0.118 tons VOC/year. Maine DEP calculated this bounding calculation as follows:

13000000 gallons/yr	**x**	55 gallons /container	**x**	222 lbs VOC/1000 units stored /yr	**/**	2000 lbs/ton)	**=**	0.118 tons VOC/yr

Calculations for PNS and Enpro resulted in VOCs of 0.073 tons/year and 0.012 tons/year respectively.

Maine DEP was unable to find any emission factors to speciate HAP emissions from the above VOC emissions, or HAP emission factors for this source category. Any significant releases would be subject to reporting under Chapter 137.

5.12 MISCELLANEOUS AREA SOURCE CATEGORIES

5.12.1 Cooling Towers

Maine DEP contact: Lisa Higgins (207)287-7023 or Lisa.Higgins@Maine.gov

Maine DEP is eliminating Cooling Towers (SCC: 2820000000) from future NEI submissions. Maine DEP does not believe that PM from these cooling towers at places like SAPPI are likely to make it past the fence line. Also, we do not believe that the other NE states report emissions from this source category either.

5.12.2 Dental Preparation and Use

Maine DEP contact: Doug Saball (207)287-8123 or Doug.Saball@Maine.gov

Maine accepted the preliminary 2002 National Emissions Inventory values.

In its preliminary calculations for Dental Preparation and Use (SCC: 31502000, formerly 31502500), EPA rolled emissions from the 1999 inventory into the 2002 inventory, since the CBP activity data was not available when EPA calculated the preliminary emissions. The national approach is identical to Maine's approach. However without updated employment number for 2002[102], Maine cannot update the emission estimate for mercury from Dental Preparation and Use.

<u>EPA 1999 Methodology</u>

The following method used to derive these emissions are quoted from "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutant (version 3)."[103]

National level mercury estimates from dental use and preparation were determined by multiplying the total amount of mercury used in the dental industry by an emissions factor. In 1995, 32 Mg (35 tons) of mercury were used in the dental industry.(1) This number is estimated to have remained constant through 1999.(3) EPA estimates that 2.0% of the mercury used in dental applications is emitted to the atmosphere.(3)

Emissions were allocated to the county-level by the county proportion of national employment as reported to the 1999 County Business Patterns(4) for SIC Code 8072, Dental Laboratories. Refer to Appendices C and E [of the above referenced document] for more details on this allocation.

<u>Sample Calculation</u>

Mercury release due to dental use and preparation = total mercury consumed by the dental industry x 2.0%
Mercury release due to dental use and preparation = 35 tons mercury consumed x 0.02
Mercury release due to dental use and preparation = 1400 lb = 0.70 tons mercury released

[102] http://www.census.gov/econ/census02/ "Data for states, metropolitan areas, counties, and cities will be published state by state and sector by sector, starting in late 2004 and finishing in mid 2005."
[103] EPA file: nonpt99ver3_july2003.pdf, page A-30.

References
1. Plachy, J. 1996. Mercury. Minerals Yearbook, Volume I -- Metals and Minerals, U.S. Geological Survey, U.S. Dept. of Interior.

2. Reese, R. 1999. Mercury. Minerals Yearbook, Volume I -- Metals and Minerals, U.S. Geological Survey, U.S. Dept. of Interior.

3. U.S. Environmental Protection Agency, "Locating and Estimating Air Emissions from Sources of Mercury and Mercury Compounds." December 1997.

4. County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001.

5.12.3 Swimming Pools

Maine DEP contact: Richard Greves (207)287-2437 or Rich.Greves@Maine.gov

Maine accepted the preliminary 2002 National Emissions Inventory values.

In its preliminary calculations Swimming Pools (SCC: 2862000000), EPA rolled emissions from the 1999 inventory into the 2002 inventory, since the CBP activity data was not available when EPA calculated the preliminary emissions. The national approach is identical to Maine's approach. However without updated activity data, Maine cannot update the emission estimate for swimming pools and accepts EPA's estimates.

EPA 1999 Methodology

The following method used to derive these emissions are quoted from "Documentation for the Final 1999 Nonpoint Area Source National Emission Inventory for Hazardous Air Pollutant (version 3)."[104]

The 1999 national emission estimates for Swimming Pools were developed by multiplying an emission factor by a national activity estimate. Emission factors for chloroform were taken from the Arizona Department of Environmental Quality Final Report No. 0493-013-9001. In 1999, there were an estimate of 7.26 million residential pools in use[2] and an estimate of 700,000 public pools in use.(3)

A usage of 525,600 minutes/year is assumed for each outdoor residential and public pools.(1) Usage assumes that pools are uncovered. Emissions were allocated to the county-level by the county proportion of national employment as reported to the 1999 County Business Patterns (4) for the multiple SIC codes related to swimming pool maintenance and outdoor recreation clubs with facilities. Refer to Appendices C and E [of the above referenced document] for more details on this allocation.

References

1. Arizona Department of Environmental Quality, 1995. Draft, Arizona Hazardous Air Pollution Research Program Final Report, Volume 1: Approach. August, 1995. Document No. 0493-013-900.

[104] EPA file: nonpt99ver3_july2003.pdf, page A-30.

2. Hulbert, Patty. National Spa and Pool Institute. 2111 Eisenhower Ave. Alexandria, VA 22314. Document 801 (Internet address: www.nspi.org)

3. Kolwalski, Les. National Swimming Pool Foundation. PO Box 495. Merrick, NY 11566. 516-623-3447. (Internet address: www.nspf.com). Personal communication with Robin Barrows, Eastern Research Group. Morrisville, NC 27560. 11 July 2001.

4. County Business Patterns 1999. United States Department of Commerce, Bureau of the Census. CBP-99-1. June 2001."

5.13 NONPOINT CATEGORIES DELETED FROM 2002 NATIONAL EMISSIONS INVENTORY

Over the years, a number of nonpoint source categories have been included or carried forward in the national inventories which, as of 2002, present an inaccurate picture of emissions in Maine. For the 2002 NEI, Maine made a concerted effort to identify those categories and mark them for deletion. Some of these categories and the reasons for deleting them are discussed previously in this document. Table 5.13-A is a complete list those categories Maine has identified for deletion and the reason.

Table 5.13-A: Nonpoint Categories Maine Deleted for 2002 NEI

SCC	SCC Description	Reason for Deletion
10300701	Commercial/Institutional; Process Gas; POTW Digester Gas-Fired Boiler	Zero activity data in Maine; deleted records carried over from 1999 NEI
2303000000	Primary Metal Production: SIC 33; All Processes	Emissions included in HAP point inventory
2305070000	Mineral Processes: SIC 32; Concrete, Gypsum, Plaster Products	Old MACT data carried forward from 1996 NEI no longer representative
2399000000	Industrial Processes: NEC	Old data carried forward from 1999 NEI that cannot be replicated
2401040000	Surface Coating; Metal Cans: SIC 341	Zero activity data in Maine
2415000000	Degreasing; All Processes/All Industries	Deleted category because it double counts emissions included in 24150* subcategories
2420000000	Dry Cleaning; All Processes; Total	Only pollutant of concern is PERC which is counted under a separate SCC
2430000000	Rubber/Plastics; All Processes	Emissions included in HAP point inventory
2440000000	Miscellaneous Industrial; All Processes	Deleted category because it double counts emissions included in SCC 2440020000
2465200000	Miscellaneous Non-industrial: Consumer; Household Products; Total	Deleted category because it double counts emissions included in SCC 2460200000
2501050120	Petroleum and Petroleum Product Storage; Bulk Stations/Terminals: Breathing Loss; Gasoline	Emissions include in CAP point inventory
2501060050	Petroleum and Petroleum Product Storage; Gasoline Service Station; Stage 1: Total	Deleted category because emissions are now reported in 250106005* subcategories
2501060052	Petroleum and Petroleum Product Storage; Gasoline Service Station; Stage 1: Splash Filling	Zero activity data in Maine; splash filling banned in Maine in 2000
2810005000	Other Combustion; Managed Burning, Slash (Logging Debris)	Zero activity data in Maine, based on survey
2810010000	Other Combustion; Human Perspiration and Respiration	Forest wildfire (2810001000) coded incorrectly in 1999 NEI; data in proper category for 2002 NEI
2810050000	Other Combustion; Motor Vehicle Fires	Negligible emissions, based on survey
30100802	Chemical Manufacturing; Chloro-alkali Production; Liquefaction (Mercury Cell Process)	Emissions include in CAP and HAP point inventory
30101880	Chemical Manufacturing; Plastics Production; Reactor (Polyurethane)	Emissions included in CAP and HAP point inventory

SCC	SCC Description	Reason for Deletion
30200756	Food and Agriculture; Grain Millings; Wet Corn Milling	Emissions included in CAP and HAP point inventory
30500201	Mineral Products; Asphalt Concrete; Rotary Dryer: Conventional Plant	Emissions included in CAP point inventory
30500799	Mineral Products; Cement Manufacturing (Wet Process)	Emissions included in CAP point inventory
30801005	Rubber and Miscellaneous Plastics Products; Plastic Products Manufacturing; Foam Production	Emissions included in HAP point inventory
30900199	Fabricated Metal Products; General Processes	Old data carried forward from 1999 NEI that cannot be replicated
30901006	Fabricated Metal Products; Electroplating Operation; Entire Process: Chrome	Deleted category because it double counts emissions included in SCC 2309100010
30906001	Fabricated Metal Products; Porcelain Enamel/Ceramic Glaze Spraying; Spray Booth	Zero activity data in Maine; deleted records carried over from 1999 NEI
31000299	Oil and Gas Production; Natural Gas Production	Zero activity data in Maine; deleted records carried over from 1996 MACT
31301001	Electrical Equipment; Light Bulb Manufacture; Light Bulb Glass to Socket Base Lubrication with SO2	Zero activity data in Maine; deleted records carried over from 1999 NEI
31301200	Electrical Equipment; Fluorescent Lamp Recycling; Fluorescent Lamp Recycling: Lamp Crusher	Zero activity data in Maine, based on survey
31401501	Transportation Equipment; Boat Manufacture	Emissions included in CAP and HAP point inventory
31502088	Photo Equip/Health Care/Labs/Air Condit/Swim Pools; Health Care – Hospitals; Laboratory Fugitive Emissions	Zero activity data in Maine; deleted records carried over from 1999 NEI
31503001	Photo Equip/Heath Care/Labs/Air Condit/Swim Pools; Dental Alloy Production (Mercury Amalgams)	Zero activity data in Maine; deleted records carried over from 1999 NEI
33000198	Textile Products; Miscellaneous	Zero activity data in Maine; deleted records carried over from 1999 NEI
39092050	In-process Fuel Use; Fuel Storage – Pressure Tanks; Natural Gas: Withdrawal Loss	Emissions included in CAP and HAP point inventory
40202301	Surface Coating Operations; Large Ships; Prime Coating Operation	Emissions included in CAP and HAP point inventory and in marine coatings category
50100701	Solid Waste Disposal – Government; Sewage Treatment; Entire Plant	Emissions included in POTWs category

Appendix A: Reporting Thresholds for HAPs for the 2002 Inventory Year

The following were the reporting thresholds for Hazardous Air Pollutants in 06-096 Chapter 137, Appendix A that were applicable in the 2002 inventory year. The reporting threshold is 2000 pounds, unless otherwise specified in the column at the right.

CASNUM	POLLUTANT	lbs
0075070	ACETALDEHYDE	200
0060355	ACETAMIDE	
0108247	ACETIC ANHYDRIDE	
0067641	ACETONE	
0075058	ACETONITRILE	
0098862	ACETOPHENONE	
0053963	2-ACETYLAMINOFLUORENE	
0107028	ACROLEIN	
0079061	ACRYLAMIDE	
0079107	ACRYLIC ACID	
0107131	ACRYLONITRILE	
0107051	ALLYL CHLORIDE	
ALUMCOMP	ALUMINUM FUME OR DUST	
0092671	4-AMINOBIPHENYL	
7664417	AMMONIA	
0062533	ANILINE	
0090040	O-ANISIDINE	
ANTICOMP	ANTIMONY & ANTIMONY COMPOUNDS	
ARSECOMP	ARSENIC & ARSENIC COMPOUNDS (ALSO INORGANIC ARSINE)	200
1332214	ASBESTOS	200
BARICOMP	BARIUM & BARIUM COMPOUNDS	
0071432	BENZENE	200
0092875	BENZIDINE	
0098077	BENZOTRICHLORIDE	
0262384	BENZO[a]PYRENE	
0100447	BENZYL CHLORIDE	
BERYCOMP	BERYLLIUM & BERYLLIUM COMPOUNDS	
0092524	BIPHENYL	
0117817	BIS(2-ETHYLHEXYL) PHTHALATE	200
542881	BIS(CHLOROMETHYL) ETHER	
0075252	BROMOFORM	
0106990	1,3-BUTADIENE	
0071363	N-BUTANOL	
0123864	N-BUTYL ACETATE	
CADMCOMP	CADMIUM & CADMIUM COMPOUNDS	200
0156627	CALCIUM CYANAMIDE	
0133062	CAPTAN	
0063252	CARBARYL	
0075150	CARBON DISULFIDE	
0056235	CARBON TETRACHLORIDE	
0463581	CARBONYL SULFIDE	
0120809	CATECHOL	
0133904	CHLORAMBEN	

CASNUM	POLLUTANT	lbs
0057749	CHLORDANE	
7782505	CHLORINE	
10049044	CHLORINE DIOXIDE	
0079118	CHLOROACETIC ACID	
0532274	2-CHLOROACETOPHENONE	
0108907	CHLOROBENZENE	
0510156	CHLOROBENZILATE	
0067663	CHLOROFORM	200
0107302	CHLOROMETHYL METHYL ETHER	
0126998	CHLOROPRENE	
CHROCOMP	HEXAVALENT CHROMIUM & CHROMIUM COMPOUNDS	10
COBACOMP	COBALT & COBALT COMPOUNDS	
COKOVEEM	COKE OVEN EMISSIONS	
COPPCOMP	COPPER & COPPER COMPOUNDS	
0095487	O-CRESOL	
0108394	M-CRESOL	
0106445	P-CRESOL	
1319773	CRESOLS/CRESYLIC ACID	
0098828	CUMENE	
CYANCOM	CYANIDE COMPOUNDS	
0094757	2,4-D, SALTS AND ESTERS	
3547044	DDE	
0334883	DIAZOMETHANE	
0132649	DIBENZOFURAN	
0096128	1,2-DIBROMO-3-CHLOROPROPANE	
0084742	DIBUTYLPHTHALATE	
0106467	1,4-DICHLOROBENZENE	
0095501	1,2-DICHLOROBENZENE	
0091941	3,3-DICHLOROBENZIDINE	
0111444	DICHLOROETHYL ETHER	
0542756	1,3-DICHLOROPROPENE	
0062737	DICHLOROVOS	
0111422	DIETHANOLAMINE	
0121697	N, N-DIETHYL ANILINE	
0064675	DIETHYL SULFATE	
0119904	3,3-DIMETHOXYBENZIDINE	
0060117	DIMETHYL AMINOAZOBENZENE	
0119937	3,3'-DIMETHYL BENZIDINE	
0079447	DIMETHYL CARBOMOYL CHLORIDE	
0068122	DIMETHYL FORMAMIDE	
0057147	1,1-DIMETHYL HYDRAZINE	
0131113	DIMETHYL PHTHALATE	
0077781	DIMETHYL SULFATE	200
0534521	4,6-DINITRO-O-CRESOL	
0051285	2,4-DINITROPHENOL	
0121142	2,4-DINITROTOLUENE	
0123911	1,4-DIOXANE	200
0122667	1,2-DIPHENYLHYDRAZINE	

CASNUM	POLLUTANT	lbs
0106898	EPICHLOROHYDRIN	200
0106887	1,2-EPOXYBUTANE	
0141435	ETHANOLAMINE	
0110805	2-ETHOXYETHANOL	
0141786	ETHYL ACETATE	
0140885	ETHYL ACRYLATE	
0100414	ETHYL BENZENE	
0051796	ETHYL CARBAMATE (URETHANE)	
0075003	ETHYL CHLORIDE (CHLOROETHANE)	
0106934	ETHYLENE DIBROMIDE (DIBROMOMETHANE)	
0107062	ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	
0107211	ETHYLENE GLYCOL	
0151564	ETHYLENE IMINE (AZIRIDINE)	
0075218	ETHYLENE OXIDE	
0096457	ETHYLENE THIOUREA	
0075343	ETHYLIDINE DICHLORIDE	
FINMINFI	FINE MINERAL FIBERS	
0050000	FORMALDEHYDE	200
0064186	FORMIC ACID	
0076131	FREON 113 (TRICHLOROTRIFLUROETHANE)	
0098011	FURFURAL	
GLYCETHE	GLYCOL ETHERS	
0076448	HEPTACHLOR	
0118741	HEXACHLOROBENZENE	
0087683	HEXACHLOROBUTADIENE	
0077474	HEXACHLOROCYCLOPENTADIENE	
0067721	HEXACHLOROETHANE	
0822060	HEXAMETHYLENE-1,6-DIISOCYNATE	
0680319	HEXAMETHYLPHOSPHORAMIDE	
0110543	HEXANE	
0302012	HYDRAZINE	
7647010	HYDROCHLORIC ACID (acid aerosol only)	
7664393	HYDROGEN FLOURIDE (HYDROFLOURIC ACID)	
7783064	HYDROGEN SULFIDE	
0123319	HYDROQUINONE	
0078591	ISOPHORONE	
0067630	ISOPROPYL ALCOHOL (used in strong acid manufacturing. processes)	
LEADCOMP	LEAD & LEAD COMPOUNDS	200
0058899	LINDANE	
0108316	MALEIC ANHYDRIDE	
MANGCOMP	MANGANESE & MANGANESE COMPOUNDS	
MERCCOMP	MERCURY & MERCURY COMPOUNDS	
0067561	METHANOL	
0072435	METHOXYCHLOR	
0109864	2-METHOXYETHANOL	
0096333	METHYL ACRYLATE	
0074839	METHYL BROMIDE (BROMOMETHANE)	
0074873	METHYL CHLORIDE	

CASNUM	POLLUTANT	lbs
0071556	METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE)	
0078933	METHYL ETHYL KETONE (2-BUTANONE)	
0060344	METHYL HYDRAZINE	
0074884	METHYL IODIDE (IODOMETHANE)	
0108101	METHYL ISOBUTYL KETONE	
0624839	METHYL ISOCYANATE	
0074931	METHYL MERCAPTAN	
0080626	METHYL METHACRYLATE	
1634044	METHYL TERT BUTYL ETHER	
0101144	4,4-METHYLENE BIS(2-CHLOROANILINE)	200
0075092	METHYLENE CHLORIDE (DICHLOROMETHANE)	200
0101688	METHYLENE DIPHENYL DIISOCYANATE	
0101779	4,4'-METHYLENEDIANILINE	
0091203	NAPTHALENE	
NICKCOMP	NICKEL & NICKEL COMPOUNDS	200
7697372	NITRIC ACID	
0098953	NITROBENZENE	
0092933	4-NITROBIPHENYL	
0100027	4-NITROPHENOL	
0079469	2-NITROPROPANE	
0684935	N-NITROSO-N-METHYLUREA	
0062759	N-NITROSODIMETHYLAMINE	
0059892	N-NITROSOMORPHOLINE	
0144627	OXALIC ACID	
0056382	PARATHION	
0082688	PENTACHLORONITROBENZENE (QUINTOBENZENE)	
0087865	PENTACHLOROPHENOL	
0108952	PHENOL	
0106503	P-PHENYLENDIAMINE	
0075445	PHOSGENE	
7803512	PHOSPHINE	
7723140	PHOSPHORUS	
0085449	PHTHALIC ANHYDRIDE	
1336363	POLYCHLORINATED BIPHENYLS	
POLORGMA	POLYCYCLIC ORGANIC MATTER	
1120714	1,3-PROPANE SULTONE	
0057578	BETA-PROPIOLACETONE	
0123386	PROPIONALDEHYDE	
0114261	PROPOXUR (BAYGON)	
0078875	PROPYLENE DICHLORIDE (1,2-DICHLOROPROPANE)	
0075569	PROPYLENE OXIDE	200
0075558	1,2-PROPYLENIMINE (2-METHYL AZIRIDINE)	
0091225	QUINOLINE	
0106514	QUINONE	
RADIONUC	RADIONUCLIDES (INCLUDING RADON)	
SELECOMP	SELENIUM & SELENIUM COMPOUNDS	
0100425	STYRENE	
0096093	STYRENE OXIDE	

CASNUM	POLLUTANT	lbs
7664939	SULFURIC ACID (acid aerosol only)	
1746016	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN & CONGENERS	0.001
0079345	1,1,2,2-TETRACHLOROETHANE	
0127184	TETRACHLOROETHYLENE (PERCHLOROETHYLENE)	200
0109999	TETRAHYDROFURAN	
13463677	TITANIUM DIOXIDE (TITANIUM OXIDE)	
7550450	TITANIUM TETRACHLORIDE	
0108883	TOLUENE	
0095807	2,4-TOLUENE DIAMINE	
0584849	2,4-TOLUENE DIISOCYANATE	
0095534	O-TOLUIDINE	
8001352	TOXAPHENE (CHLORINATED CAMPHENE)	
0120821	1,2,4-TRICHLOROBENZENE	
0079005	1,1,2-TRICHLOROETHANE	
0079016	TRICHLOROETHYLENE	200
0088062	2,4,6-TRICHLOROPHENOL	
0095954	2,4,5-TRICHLOROPHENOL	
1582098	TRIFLURALIN	
0540841	2,2,4-TRIMETHYLPENTANE	
8006642	TURPENTINE	
0108054	VINYL ACETATE	
0593602	VINYL BROMIDE	
0075014	VINYL CHLORIDE	
0075354	VINYLIDENE CHLORIDE (1,1-DICHLOROETHYLENE)	
0106423	P-XYLENES	
0095476	O-XYLENES	
0108383	M-XYLENES	
1330207	XYLENES (ISOMERS & MIXTURE)	
ZINCCOMP	ZINC & ZINC COMPOUNDS	

Appendix B: 2002 Point Source Criteria Air Pollutant Emission Estimates by Facility, as filed 5/1/05 with U.S. EPA

Facility ID	NEI Unique ID	Facility Name	CO	NH3	NOX	PM10-FIL	PM25-FIL	SO2	VOC
2302500027	NEI33118	SAPPI - SOMERSET	2144.390	118.882	1803.660	312.220	144.397	3300.960	133.411
2301900056	NEI6287	GREAT NORTHERN PAPER INC MILL WEST	23.293	15.289	1304.400	278.371	163.288	4544.897	165.377
2300700021	NEI6261	INTERNATIONAL PAPER - ANDROSCOGGIN	1964.335		1274.515	567.047	425.097	1661.208	370.558
2302900020	NEI46835	DOMTAR MAINE CORP	1238.331	54.469	1135.040	561.999	480.156	550.408	461.797
2301700045	NEI6273	MEADWESTVACO OXFORD CORP	936.110	70.552	1963.230	338.940	38.720	501.030	101.479
2300500138	NEI33072	S D WARREN CO - WESTBROOK	1019.759	0.877	1022.900	32.940	3.312	967.800	421.392
EGU0533	NEI6988	William F Wyman		11.305	563.500			1982.400	
2301900058	NEI6285	GREAT NORTHERN PAPER INC MILL EAST	131.581	4.572	585.416	77.682	1.701	1237.566	385.206
2301300028	NEIME0130002	DRAGON PRODUCTS CO INC - THOMASTON	184.960	2.303	1727.080	68.233	15.862	313.287	7.801
2301900023	NEI33104	LINCOLN PULP AND PAPER CO INC	948.439	25.126	400.019	197.229	143.244	216.537	238.934
2301900034	NEI33103	GEORGIA-PACIFIC CORPORATION	179.045	463.018	423.605	185.983	85.253	485.561	59.139
2300700023	NEIME0072300	BORALEX STRATTON ENERGY INC	1028.575	0.042	466.470	3.065	2.590	22.688	2.529
2300900004	NEI6284	INTERNATIONAL PAPER - BUCKSPORT	223.097		272.276	29.907		599.642	340.543
2301900020	NEI6283	EASTERN FINE PAPER INC	19.017	3.007	187.580	18.010	11.013	889.772	55.175
2302500020	NEIME0250002	MADISON PAPER INDUSTRIES	19.855	3.177	168.340	58.147	34.960	853.901	21.112
2300300051	NEIME14189	BORALEX FORT FAIRFIELD	672.594	0.005	443.147	0.929	1.014	15.318	2.796
EGU0540	NEI2MEGU0540	BUCKSPORT CLEAN ENERGY	578.713	45.269	194.400	13.374	13.374	7.600	14.821
2301300009	NEI6300	FMC BIOPOLYMER	11.159		104.904	37.605	0.521	552.233	280.626
2302900021	NEI33121	LOUISIANA-PACIFIC CORP - WOODLAND OSB	496.718		153.727	145.005	102.397	5.859	43.835
2303100078	NEI33124	MAINE ENERGY RECOVERY COMPANY	239.426		518.288	27.898		26.662	51.794
2301100036	NEI33084	HUHTAMAKI FOODSERVICE INC	27.498	1.623	187.695	43.815	0.507	591.077	8.128
2300300048	NEI6297	J M HUBER CORPORATION	448.230		115.982	56.696	25.541	3.498	135.494
2300100087	NEIME0010087	BORALEX LIVERMORE FALLS	511.940		213.482	14.239	12.010	26.787	3.044
2300300032	NEIME0030032	MCCAIN FOODS USA INC - EASTON	11.729	1.834	136.120	87.629	17.909	498.890	3.974
2302900003	NEI6293	NAVAL COMPUTER & TELECOMM DET - CUTLER	86.831	0.557	403.368	28.388	0.025	28.868	21.396
2300700007	NEI33081	WAUSAU-MOSINEE PAPER CO - OTIS MILL	18.832	3.010	204.136	63.115	33.310	220.763	23.437
2301900115	NEI2ME900115	MAINE INDEPENDENCE STATION	316.756	3.240	76.555	60.815	60.836	7.517	27.448
2301900093	NEI33108	PENOBSCOT ENERGY RECOVERY CO	108.577	0.202	367.765	3.738	2.050	36.218	1.557
2300300014	NEIME0030140	MCCAIN FOODS USA INC - TATERMEAL	52.698	0.640	58.017	70.996	0.520	250.913	77.639

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2302100014	NEIME2302100	GREENVILLE STEAM CO	231.856		94.303	0.186	0.060	179.644	3.808
2301900055	NEIME14202	WHEELABRATOR-SHERMAN ENERGY CO	231.832	0.003	190.331	19.332	16.317	10.420	1.398
2300300072	NEIME0030072	BORALEX ASHLAND	272.773	13.590	136.522	0.230	0.224	6.120	14.143
2300300062	NEI6299	LOUISIANA-PACIFIC CORP - NEW LIMERICK	242.472	0.007	119.636	20.859	8.050	7.466	4.656
2300500142	NEIME0050142	REGIONAL WASTE SYSTEMS INC	41.206	0.706	336.235	3.009	0.109	12.408	8.623
2301900086	NEIME0190086	INDECK WEST ENFIELD ENERGY CENTER	236.370	0.003	137.413	0.363	8.053	10.509	5.846
2300100024	NEIMERSMWC-6	MID MAINE WASTE ACTION CORPORATION	0.705		382.612	0.128		5.471	0.032
2301900028	NEIME0190028	UNIVERSITY OF MAINE ORONO	7.910	1.211	79.020	10.052	15.652	221.000	1.272
2302500002	NEI6306	IRVING TANNING COMPANY	3.093	0.493	46.257	14.382	6.888	96.823	160.172
2300300050	NEIME14187	J PAUL LEVESQUE & SONS INC - MASARDIS	189.795		20.933	4.547	22.242	1.047	80.804
2302500028	NEIME0250028	BORALEX ATHENS ENERGY	180.276		108.165	12.018		8.012	3.027
2303100053	NEIME0310053	PORTSMOUTH NAVAL SHIPYARD	46.851	1.932	168.905	4.740	0.181	52.378	24.170
2302700005	NEIME0272302	ROBBINS LUMBER INC	125.557	0.014	60.944	61.553	0.769	2.386	44.536
2300100027	NEI6258	PIONEER PLASTICS CORPORATION	10.991	0.892	45.474	6.565	5.930	139.501	63.157
2300500193	NEI2ME500193	WESTBROOK ENERGY CENTER	33.030	34.342	114.226	32.905	0.030	8.232	4.235
2301700046	NEIME14197	IRVING FOREST PRODUCTS - DIXFIELD	53.274	0.009	43.470	28.820	17.679	1.972	77.716
2302300004	NEI6292	BATH IRON WORKS - BATH FACILITY	5.771	0.813	50.810	9.449	4.277	71.410	55.561
2302500040	NEI2ME500040	CROSSROADS LANDFILL	61.782		11.361	14.190	0.000	63.470	0.220
2300300033	NEI46851	IRVING FOREST PRODUCTS - PINKHAM SAWMIL	46.254		8.129	18.974	2.645	1.947	58.230
2300300027	NEIME0030002	NEXFOR FRASER PAPERS INC	4.060		38.164	0.128	0.003	90.148	2.477
2301700056		RUMFORD POWER ASSOCIATES	54.300	0.800	70.000	0.849		4.000	4.612
2301700056	NEI6273	RUMFORD POWER ASSOCIATES	54.300	0.800	70.000	0.849		4.000	4.612
2303100028	NEIME0310002	PRIME TANNING COMPANY INC	1.953		18.307	4.187	2.697	61.465	41.709
2300100035	NEIME0010003	MASONITE CORP	68.535	0.805	6.747	11.748		0.308	38.709
2303100020	NEI6246	CYRO INDUSTRIES	3.300		28.044	3.896	0.190	85.159	0.240
2300500087	NEIME0050087	BOWDOIN COLLEGE	2.839	0.415	32.681	8.434	0.913	71.023	0.790
2301700038	NEI2ME017230	HANCOCK LUMBER CO INC	16.048		7.714	28.784	16.753	14.073	31.561
2302500043	NEI2ME500043	MOOSE RIVER LUMBER COMPANY INC	14.856	0.241	15.466	10.050	6.924	15.535	50.151
2300500135	NEI6988	FPL ENERGY WYMAN LLC	81.982			19.205	0.767		11.237

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2302900030	NEI2ME029030	MARITIMES & NORTHEAST PIPELINE LLC	62.644	0.842	30.515	1.628		0.922	13.262
2302100006	NEIME0210006	HARDWOOD PRODUCTS COMPANY	67.628		5.666	18.132	15.413	0.547	1.155
2300300070	NEIME14186	J PAUL LEVESQUE & SONS INC - ASHLAND	9.675		3.547	16.608	24.832	3.628	49.968
2300500131	NEIME0050131	PORTLAND PIPE LINE CORPORATION	0.000		0.000	0.000		0.000	106.000
2300700061	NEI54334	J & L ELECTRIC (FORSTER INC - STRONG)	51.091		2.942	10.864	6.387	0.581	32.556
2303100025	NEIME14209	LAVALLEY LUMBER CO LLC	40.746		33.770	3.011	2.996	1.766	18.446
2300700026	NEIME2300700	STRATTON LUMBER INCORPORATED	40.792		14.957	13.597	8.158	1.700	21.184
2300500123	NEI33068	EXXONMOBIL OIL PORTLAND TERMINAL	12.493		4.997				79.194
2300700035	NEI2ME007035	SPECIALTY MINERALS INC	22.152		53.164	6.381		6.204	6.204
2301100003	NEIME0110003	AUGUSTA MENTAL HEALTH INSTITUTE	1.368	0.000	20.514	3.201	1.077	65.070	0.155
2303100046	NEIME0310046	DAYTON SAND AND GRAVEL CO INC	38.167		19.356	3.814	4.754	24.197	0.924
2301900003	NEIME0190003	EASTERN MAINE MEDICAL CENTER	2.954	0.393	25.253	2.807	0.190	54.391	0.660
2300300011	NEI6296	A E STALEY MANUFACTURING COMPANY	1.606	0.262	25.677	10.067	3.019	35.895	6.705
EGU0538	NEI2ME700033	ANDROSCOGGIN COGENERATION CENTER			76.000			3.100	
2302500023	NEI2ME500023	PIKE INDUSTRIES INC - FAIRFIELD	6.165		15.555	3.591		47.255	3.320
2301100039	NEIME0110039	COLBY COLLEGE	2.764	0.447	25.701	2.113	0.969	42.672	0.620
2301700013	NEI6271	ROBINSON MANUFACTURING COMPANY	0.985	0.158	9.259	3.145	0.885	54.990	4.823
2302100019	NEI2ME100019	PLEASANT RIVER LUMBER CO	1.474		10.317	2.955	2.890	13.031	41.981
2300100056	NEIME0010056	PIKE INDUSTRIES INC - LEWISTON	32.105		9.632	1.605		24.079	3.692
2300700022	NEI6307	KINGFIELD WOOD PRODUCTS	18.770		7.680	7.680	15.557	0.213	20.642
2302500037	NEI2ME500037	COUSINEAU WOOD PRODUCTS	24.108		3.310	20.241	20.241	0.801	1.169
2303100067	NEI6247	SPENCER PRESS OF MAINE INC	4.225	0.161	5.029	0.151		0.030	59.892
2300500119	NEIME0050011	MOTIVA ENTERPRISES - SOUTH PORTLAND	13.500		5.400	0.022		0.004	49.097
2302100016	NEIME0210016	BARRETT PAVING MATERIALS INC	8.292		29.559	9.689	3.003	14.623	1.921
2301900052	NEIME0190052	PERMA TREAT CORP	26.153		4.447	14.972	12.619	0.981	6.539
2301900123	NEI2ME900123	OLD TOWN LUMBER	9.498		38.737	1.692	1.692	2.846	10.927
2303100029	NEI6239	PRATT & WHITNEY - NO BERWICK	4.258	0.284	13.286	1.629	1.163	31.455	11.903
2300100083	NEIME0010083	PIKE INDUSTRIES INC - POLAND	9.715	0.029	32.515	4.132	3.755	6.529	4.390
2300300063	NEI6298	NATIONAL STARCH & CHEMICAL CO	17.412		20.312	11.495	7.369	2.051	2.282

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2300300017	NEIRMEWP-325	COLUMBIA FOREST PRODUCTS VENEER DIV2002	20.787		13.672	9.839	9.746	1.389	5.048
2301700001	NEI2ME700001	FOREST INDUSTRIES	15.336		12.524	14.084	14.084	0.639	2.890
2300100070	NEIME0010070	CENTRAL MAINE MEDICAL CENTER	1.271		21.876	7.214	0.554	26.665	0.055
2302500011	NEIME0250011	SOLON MANUFACTURING CO INC	12.255		15.319	11.030	16.759	0.460	0.345
2301100075	NEIME0110075	TEX TECH INDUSTRIES INC	0.724	0.095	6.545	2.692	1.450	37.788	5.709
2301100004	NEIME0110004	VA MEDICAL CENTER	2.437		18.883	0.259	0.022	32.207	0.447
2300100051	NEI43363	MORIN BRICK COMPANY - AUBURN	18.424		9.876	13.209		9.339	3.048
2300900001	NEI2ME900001	JACKSON LABORATORY	4.436	0.628	17.550	1.869	0.451	27.928	0.263
2303100004	NEI6241	WESTPOINT STEVENS INC	8.016	0.971	12.202	7.066	10.367	0.056	13.518
2300500103	NEIME0050010	BRUNSWICK NAVAL AIR STATION	11.528	0.083	16.988	1.001	0.401	2.987	18.868
2301700058	NEI2ME700058	LOVELL LUMBER CO INC	11.158	0.040	24.746	4.024	4.024	0.584	6.143
2300100076	NEI2ME100076	INTERNATIONAL PAPER - AUBURN	6.407	0.044	9.360	3.278	1.048	25.448	3.680
2300500089	NEI6243	BATH IRON WORKS - HARDING FACILITY	1.106	0.145	7.136	2.443	1.023	30.022	6.960
2303100041	NEI2ME100041	F R CARROLL INC	9.672		27.123	4.039	2.724	1.470	3.704
2301700004	NEIME0170004	ANDOVER WOOD PRODUCTS INC	11.183		1.958	15.359	15.273	0.435	3.910
2300500151	NEIME0050151	COMMERCIAL PAVING CO INC	6.191		27.742	3.018	2.974	4.366	3.254
2300100072	NEI33055	DINGLEY PRESS	2.436	0.014	3.207	0.095		0.019	40.268
2301100033	NEIME0110033	MAINE GENERAL MEDICAL CENTER - THAYER	1.037		9.748	1.619	0.593	32.897	0.111
2301900030	NEI33107	OLD TOWN CANOE	1.142	0.135	7.462	2.150	0.280	30.956	3.572
2301100069	NEI2ME100069	PIKE INDUSTRIES INC - AUGUSTA 712	7.920		26.130	6.060		1.480	3.990
2300700033	NEI2ME700033	ANDROSCOGGIN ENERGY LLC	4.570	33.500		4.284			3.114
2300500004	NEIME0050004	UNIV OF SOUTHERN MAINE AT PORTLAND	0.908		6.164	1.765	0.570	35.783	0.054
2302700035	NEI2ME027035	PRIDE MANUFACTURING CO	9.115		1.606	17.978	12.445	0.446	3.186
2300500009	NEIME0050009	BURNHAM AND MORRILL CO	3.070	0.222	13.582	1.525	0.009	26.024	0.191
2300100004	NEIME0010004	SAINT MARYS REGIONAL MEDICAL CENTER	16.883	0.146	21.944	1.267	0.120	2.403	1.146
2300500098	NEI33062	GULF OIL LIMITED PARTNERSHIP	0.374	0.060	4.675	0.379	0.296	12.506	23.934
2301900102	NEI2ME900102	LANE CONSTRUCTION CORP - HERMON (38)	4.445		12.885	0.187	0.179	16.300	6.325
2302300024	NEI2ME023024	MARITIMES & NORTHEAST PIPELINE LLC	13.279	0.394	18.498	0.762		0.431	6.760
2302100005	NEIME0210005	INTERFACE FABRICS GROUP NORTH INC	19.285	0.019	8.960	2.821	6.080	1.676	0.671

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2300100016	NEIME0010016	BATES COLLEGE	4.680	0.274	10.572	0.692	0.272	22.655	0.358
2303100081	NEIME0310081	INTERSTATE BRANDS CORPORATION	7.562		9.002	0.270		0.054	22.326
2301100034	NEIME0110034	MAINE GENERAL MEDICAL CENTER - SETON	0.901		8.279	1.352	0.501	27.329	0.062
2300500191	NEI6254	NATIONAL SEMICONDUCTOR CORP	10.804		9.678	1.919	0.122	14.974	0.620
2302100012	NEI54370	MOOSEHEAD MFG CO - DOV-FOX	5.576		2.045	2.788	2.788	0.232	24.454
2301900085	NEI2ME900085	LANE CONSTRUCTION CORP - HERMON (12&26)	5.960		19.646	0.356	0.347	11.060	0.262
2300500148	NEIME0050148	PIKE INDUSTRIES INC - PORTLAND	6.759		16.652	5.300		4.702	4.114
2300300071	NEI2ME300071	TROMBLEY INDUSTRIES INC	7.977		21.547	1.768	1.668	2.131	1.161
00700021	NEI6261	INTERNATIONAL PAPER CO. ANDRO		35.939					
00700021	NEI6261	INTERNATIONAL PAPER - ANDROSCOGGIN		35.939					
2301300035	NEI2ME300035	O'HARA ICE COMPANY	5.343	0.033	24.825	1.747	1.747	0.082	1.320
2300300040	NEI2ME300040	LANE CONSTRUCTION CORP (23)	21.806		6.949	0.096	0.030	4.811	0.468
2302700020	NEIME0270002	IRVING OIL CORP	0.090		0.990	0.323	0.077	4.100	27.390
2301900117	NEIMET$475	MAINE AIR NATIONAL GUARD 101ST AIR	2.183		5.388	0.631	0.502	6.192	17.991
2303100040	NEIME0310040	PIKE INDUSTRIES INC - WELLS	6.255		15.410	2.407	2.719	1.740	3.807
2302100001	NEIME0210001	MOOSEHEAD MFG CO - MONSON	3.539		1.942	2.651	2.651	0.133	21.334
2300700038	NEI2ME007038	FARMINGTON CHIPPING ENTERPRISES INC	6.208		23.369	0.731	0.731	0.365	0.657
2300100105	NEIME0010105	FORMED FIBER TECHNOLOGIES	1.771		4.161	20.203		0.027	5.733
2300700034	NEI2ME700034	BRUCE A MANZER INC	6.380		14.362	3.267		4.196	2.193
2301900083	NEI2ME019019	COLD BROOK ENERGY INC	4.090		1.670				24.624
2303100013	NEIME0310001	GENERAL DYNAMICS ARMAMENT SYSTEMS	1.001		12.346	0.950	0.757	13.780	0.553
2300500145	NEIME0050014	GLOBAL COMPANIES LLC	0.856	0.136	8.047	0.864	0.358	17.564	0.194
2302300011	NEIME0230001	HARRY C CROOKER & SONS INC - TOPSHAM	13.319	0.003	2.688	2.151	1.728	5.654	1.539
2300300076	NEI2ME300076	MAINE WOODS CO	15.109	1.170	2.602	1.226	1.034	0.568	5.287
2301900118	NEIRMEWP-320	CALLEY & CURRIER CO	8.890		0.512	9.052	7.368	0.101	0.280
2300900031	NEI2ME900031	BANGOR HYDRO-ELECTRIC CO - BAR HARBOR	5.150		19.990	0.185		0.307	0.546
2301700043	NEI2ME700043	PIKE INDUSTRIES INC - N WATERFORD	2.546		6.274	1.144	1.107	11.071	1.698
2301300036	NEIME0130079	NORTH END COMPOSITES	0.072		0.258	0.035		1.027	22.310
2302700021	NEI2ME027021	LANE CONSTRUCTION CORP - PROSPECT (28)	3.179		9.838	0.025	0.023	6.793	3.492

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2300700037	NEI2ME007037	PIKE INDUSTRIES INC - FARMINGTON	4.712	0.010	11.709	1.856	0.218	1.939	2.832
2301700008	NEI2ME700008	BETHEL FURNITURE STOCK INC	5.256		0.894	7.805	7.188	0.197	1.840
2300300024	NEI2ME003024	LORING COMMERCE CENTRE	1.110	0.178	5.329	0.240	0.184	15.943	0.075
2301900104	NEI2ME900104	LANE CONST CORP DBA SUNRISE MATLS (47)	5.853		12.213	0.299	0.294	2.819	1.442
2301900124	NEI2ME900124	BANGOR HYDRO-ELECTRIC CO - MEDWAY	4.572		17.220	0.308		0.273	0.485
2301900092	NEI2ME900092	CHARLESTON CORRECTIONAL FACILITY	1.141	0.108	4.962	1.071	0.220	15.194	0.156
2300100021	NEIME0010021	PHILIPS ELMET	2.876	8.844	4.687	0.374	0.366	2.418	2.658
2300500120	NEIME0050120	SPRAGUE ENERGY	0.647	0.103	6.346	1.450	0.033	9.195	3.164
2302500044	NEI2ME500044	CIANBRO FABRICATION AND COATING CORP	0.084		0.622	0.445	0.054	0.259	19.368
2301900105	NEI2ME900105	LANE CONSTRUCTION CORP - HERMON (37)	2.684		6.461	0.153	0.139	7.740	3.589
2301900119	NEI2ME900119	VIC FIRTH MFG INC	2.109		2.363	7.154	0.342	0.166	8.517
2300500202	NEI2ME500202	MEGQUIER HILL FARMS	7.088		5.788	6.272		0.295	0.449
2301700060	NEI33099	NATIONAL WOOD PRODUCTS	0.138		0.813	0.026		0.019	17.959
2302500007	NEI6309	EDWARDS SYSTEMS TECHNOLOGY	0.235	0.038	3.187	1.414	1.414	11.108	1.462
2301900126	NEI2ME900126	NORTHEASTERN LOG HOMES	0.732		2.932	1.222	1.222	4.152	8.584
2301900121	NEI2ME900121	HYPONEX CORPORATION	2.734		12.703	0.893	0.893	0.835	0.675
2301900078	NEIME0190078	EXXONMOBIL OIL BANGOR TERMINAL							17.787
2302500031	NEI2ME500031	PIKE INDUSTRIES INC - ANSON	3.430		8.450	1.380		2.386	2.088
2301900064	NEI2ME900064	LANE CONSTRUCTION CORP - HERMON (32)	4.962		5.193	0.886	0.138	4.026	2.425
2302100013	NEI33110	MONTREAL MAINE & ATLANTIC RAILWAY	0.357	0.057	4.999	1.999	1.999	7.848	0.080
2300500067	NEIME0050067	UNIV OF SOUTHERN MAINE AT GORHAM	4.270	0.023	6.174	0.644	0.102	5.175	0.293
2302300025	NEI2ME300025	GRIMMEL INDUSTRIES	2.379		11.053	0.778	0.778	0.727	0.587
2300500057	NEI2ME500057	SAUNDERS BROTHERS	1.962		1.604	2.045	2.045	0.082	8.475
2300500129	NEI6248	SANMINA CORP	0.375		0.446	0.013		0.003	15.365
2300100084	NEIME1146	TAMBRANDS INC	0.327	0.052	3.078	0.412	0.249	9.628	2.413
2301300038	NEI2ME300038	MAINE STATE PRISON AT WARREN	0.917		6.512	0.877	0.183	6.428	0.050
2300900019	NEIME0090001	WEBBER TANKS INC - BUCKSPORT							14.734
2300500029	NEIME0050029	MAINE MEDICAL CENTER	5.976		7.760	0.232	0.000	0.048	0.428
2300500053	NEIMET$461	FAIRCHILD SEMICONDUCTOR CORP	5.616	0.217	6.846	0.694	0.062	0.355	0.366

Appendix B: 2002 Point Source Criteria Air Pollutant Emission Estimates by Facility, as filed 5/1/05 with U.S. EPA

Facility ID	NEI Unique ID	Facility Name	CO	NH3	NOX	PM10-FIL	PM25-FIL	SO2	VOC
EGU0541	NEIME0152301	Mason Steam		0.133	4.700			9.200	
2300900030	NEI2ME009030	HINCKLEY COMPANY - TRENTON	0.119		0.861	0.027	0.110	0.005	12.579
2303100071	NEIME0310071	GENEST CONCRETE WORKS INC - SANFORD	0.081	0.008	0.470	12.425	0.002	0.604	0.006
2301900106	NEI2ME900106	LANE CONSTRUCTION CORP - HERMON (RAP)	2.034		9.442	0.257	0.257	0.460	0.750
2300100104	NEI2ME100104	PERFORMANCE PRODUCT PAINTING	0.112		0.663	0.021		0.003	12.339
2302500032	NEI2ME500032	MATTINGLY PRODUCTS CO INC	5.772	0.004	4.500	0.080	0.080	1.189	1.262
2301500010	NEIME0152301	FPL ENERGY MASON LLC	1.212		6.700	0.092	0.091	4.420	0.183
2303100001	NEIME14208	SOUTHERN MAINE MEDICAL CENTER	1.112	0.062	3.109	1.342	1.341	3.612	1.797
2301900018	NEI16608	OSRAM SYLVANIA INC	0.112	0.018	0.451	0.375	0.019	0.662	10.438
2300300069	NEI2ME300069	HOULTON INTERNATIONAL CORP	5.350		3.745	0.867		0.201	1.872
2301900127	NEI2ME900127	PINE TREE LANDFILL	7.880		2.100		0.894	0.424	0.335
2301900084	NEI2ME900084	LANE CONST CORP DBA SUNRISE MATLS (35)	1.501		4.527	0.015	0.005	3.269	1.693
2300500046	NEIME0050046	LONG CREEK YOUTH DEVELOPMENT CENTER	0.303	0.048	1.452	0.065	0.050	8.591	0.021
2300500201	NEI2ME500201	MID COAST HOSPITAL	0.440		1.851	0.951	0.902	5.697	0.059
2300300004	NEI2ME003004	CARY MEDICAL CENTER	0.651		3.123	0.141	0.109	5.504	0.032
2301900002	NEIME14201	BANGOR MENTAL HEALTH INSTITUTE	0.596		4.885	0.132	0.102	3.222	0.031
2300700036		CARRABASSETT VALLEY SANITARY DISTRICT	1.294		6.010	0.423	0.423	0.395	0.319
2300300010	NEIME14190	HOULTON REGIONAL HOSPITAL	0.283	0.042	2.981	0.346	0.127	5.006	0.064
2302700037	NEI2ME027037	MBNA BRACEBRIDGE CORP	0.893	0.057	3.843	0.179	0.253	3.285	0.110
2300900003	NEI2ME009003	BLUE HILL MEMORIAL HOSPITAL	0.185		2.045	0.262		5.896	0.052
2301900114	NEI2ME900114	LANE CONSTRUCTION CORP - HERMON (41)	1.231		5.718	0.403	0.403	0.376	0.304
2300900032	NEI2ME900032	HAROLD MACQUINN INC	1.101		5.115	1.004	0.360	0.336	0.272
2300500101	NEI33073	SABRE CORPORATION	0.089	0.013	0.343	0.008	0.008	0.823	6.514
2303100087	NEI2ME100087	PIKE INDUSTRIES INC -SOUTH BERWICK (IBM)	0.395		1.582	0.079	0.020	5.615	0.016
2301700022	NEIME0170022	PENLEY CORPORATION	3.402		1.423	0.835	1.692	0.028	0.043
02500027	NEI33118	SAPPI - SOMERSET		6.750					
02500027	NEI33118	SAPPI (S. D. WARREN - SOMERSET)		6.750					
2303100084	NEI2ME031230	MILLROCK INC							6.497
2303100047	NEIME0310004	HUSSEY SEATING CO	1.057		1.280	0.040	0.002	0.014	4.071

Appendix B: 2002 Point Source Criteria Air Pollutant Emission Estimates by Facility, as filed 5/1/05 with U.S. EPA									
Facility ID	NEI Unique ID	Facility Name	CO	NH3	NOX	PM10-FIL	PM25-FIL	SO2	VOC
2300500176	NEI33067	MAINE RUBBER INTERNATIONAL	0.295	0.007	1.431	0.043		0.009	4.679
2302900015	NEI2ME029015	LANE CONST CORP - CALAIS (24)	2.538		2.091	0.040	0.039	0.825	0.534
2300900029	NEI6294	HINCKLEY COMPANY - SOUTHWEST HARBOR	0.018	0.003	0.070	0.007	0.001	0.174	5.608
00300026	NEI2ME300026	ATLANTIC CUSTOM PROCESSORS LLC		4.500					
2302900010	NEI2ME900010	BANGOR HYDRO-ELECTRIC CO - EASTPORT	0.843		3.265	0.030		0.051	0.090
2300100081	NEIME1147	MPAC (MAINE POLY ACQUISTION CORP)	0.138		0.818	0.078		0.000	3.131
2300300067	NEI2ME300067	LANE CONSTRUCTION CORP - PI (43)	0.441		1.829	0.000		1.744	0.005
2302900023	NEIME0290023	INDECK JONESBORO ENERGY CENTER	2.140	0.001	1.169	0.022	0.028	0.071	0.358
2300100092	NEI2ME100092	QUALITY EGG OF NEW ENGLAND, LLC-DECOSTER	0.248	0.036	1.008	0.097	0.045	2.253	0.015
2302700016	NEI2ME700016	LANE CONSTRUCTION CORP - PROSPECT (16)	0.513		2.386	0.046	0.066	0.561	0.127
2300500204	NEI2ME500204	WOLVERINE (SEBAGO MECHANIC ST WESTBROOK)	0.063		0.075	0.002		0.000	3.323
2300500192	NEIME0050192	FPL ENERGY CAPE LLC	0.126		1.224	0.087		0.758	0.043
2300300001	NEIME14191	WPS NEW ENGLAND GENERATION INC - CARIBOU	0.280		1.078	0.326		0.279	0.040
2301900122	NEI2ME900122	LOU SILVER INC	0.292	0.002	1.359	0.069	0.096	0.089	0.072
2300300036	NEI2ME003036	LANE CONSTRUCTION CORP (22)	0.283		1.106	0.025	0.020	0.317	0.186
02700007	NEI2ME700007	GENERAL ALUM NEW ENGLAND (DELTA)		1.784					
2300500198	NEI2ME500198	SEBAGO INC - BRIDGTON	0.023		0.091	0.009	0.004	0.324	1.193
2300500025	NEI2ME500025	ETHERIDGE FOUNDRY AND MACHINE CO	0.000		0.000	0.147		0.000	1.490
2302500004	NEIME14204	DIRIGO DOWELS INC	0.898		0.065	0.245	0.245	0.025	0.016
2300300046	NEIME0030046	WPS NEW ENGLAND GENERATION INC - PRESQUE	0.259	0.000	0.995	0.055	0.085	0.012	0.027
00300032	NEIME0030032	MCCAIN FOODS USA INC.		1.000					
00502060	NEI2ME502060	OAKHURST DAIRY		1.000					
2302500045	NEI2ME500045	CARRIER CHIPPING INC	0.004		0.015	0.772		0.005	0.000
2302700036		F C WORKS & SONS GROUND EFFECTS	0.104		0.483	0.047	0.034	0.032	0.026
2301900079	NEIME0190007	WEBBER TANKS INC - BREWER							0.702
2300500203	NEI2ME500203	SEBAGO INC - GORHAM	0.100		0.120	0.004		0.001	0.389
01900034	NEI33103	FORT JAMES OPERATING CO./OLD TOWN		0.250					

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Facility ID	NEI Unique ID	Facility Name	CO	NH3	NOX	PM10-FIL	PM25-FIL	SO2	VOC
02900020	NEI46835	Domtar Maine Corp		0.250					
01900034	NEI33103	GEORGIA-PACIFIC CORPORATION		0.250					
00500053	NEIMET$461	FAIRCHILD SEMICONDUCTOR CORP.		0.201					
2300900015	NEI2ME009015	LANE CONSTRUCTION CORP - HANCOCK (42)	0.013		0.054	0.005	0.001	0.081	0.001
01900056	NEI6287	GREAT NORTHERN PAPER INC MILL WEST		0.125					
01900056	NEI6287	GNP - MILLINOCKET		0.125					
2300300026	NEI2ME300026	ATLANTIC CUSTOM PROCESSORS LLC	0.003		0.027	0.001	0.000	0.094	0.000
T$462	NEI6254	NATIONAL SEMICONDUCTOR		0.086					
01700045	NEI6273	MEAD PAPER DIVISION		0.013					
01700045	NEI6273	MEADWESTVACO OXFORD CORP		0.013					
00300670	NEI2ME300670	SMITH & WESSON DIVISION		0.005					

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
A. E. Staley Manufacturing	300011	Propylene Oxide	4099
Auburn Landfill	LF9984	1,1,2,2-Tetrachloroethane	0.0071912
Auburn Landfill	LF9984	1,4-Dichlorobenzene	0.0011915
Auburn Landfill	LF9984	Acrylonitrile	0.012964
Auburn Landfill	LF9984	Benzene	0.033465
Auburn Landfill	LF9984	Carbon Disulfide	0.0017043
Auburn Landfill	LF9984	Carbon Tetrachloride	0.047502
Auburn Landfill	LF9984	Carbonyl Sulfide	0.0011361
Auburn Landfill	LF9984	Chlorobenzene	0.0010861
Auburn Landfill	LF9984	Chloroform	0.00013824
Auburn Landfill	LF9984	Ethyl Benzene	0.018889
Auburn Landfill	LF9984	Ethyl Chloride	0.0031129
Auburn Landfill	LF9984	Ethylene Dibromide	0.014503
Auburn Landfill	LF9984	Ethylene Dichloride	0.001566
Auburn Landfill	LF9984	Ethylidene Dichloride	0.0089751
Auburn Landfill	LF9984	Hexane	0.021854
Auburn Landfill	LF9984	Mercury & Compounds	0.004522
Auburn Landfill	LF9984	Methyl Chloride	0.002358
Auburn Landfill	LF9984	Methyl Chloroform	0.0024718
Auburn Landfill	LF9984	Methyl Ethyl Ketone	0.019733
Auburn Landfill	LF9984	Methyl Isobutyl Ketone	0.0072292
Auburn Landfill	LF9984	Methylene Chloride	0.046882
Auburn Landfill	LF9984	Propylene Dichloride	0.00078493
Auburn Landfill	LF9984	Tetrachloroethylene	0.023874
Auburn Landfill	LF9984	Toluene	0.58673
Auburn Landfill	LF9984	Trichloroethylene	0.0143
Auburn Landfill	LF9984	Vinyl Chloride	0.017706
Auburn Landfill	LF9984	Vinylidene Chloride	0.00074832
Auburn Landfill	LF9984	Xylenes (Mixture of o, m, and p Isomers)	0.049579
Auburn Manufacturing Inc.	108028	Hydrochloric Acid	400
Augusta Landfill	LF6211	1,1,2,2-Tetrachloroethane	0.0081082
Augusta Landfill	LF6211	1,4-Dichlorobenzene	0.0013434
Augusta Landfill	LF6211	Acrylonitrile	0.014617
Augusta Landfill	LF6211	Benzene	0.037732
Augusta Landfill	LF6211	Carbon Disulfide	0.0019216
Augusta Landfill	LF6211	Carbon Tetrachloride	0.05356
Augusta Landfill	LF6211	Carbonyl Sulfide	0.001281
Augusta Landfill	LF6211	Chlorobenzene	0.0012246
Augusta Landfill	LF6211	Chloroform	0.00015587
Augusta Landfill	LF6211	Ethyl Benzene	0.021298
Augusta Landfill	LF6211	Ethyl Chloride	0.0035098
Augusta Landfill	LF6211	Ethylene Dibromide	0.016353
Augusta Landfill	LF6211	Ethylene Dichloride	0.0017657
Augusta Landfill	LF6211	Ethylidene Dichloride	0.01012
Augusta Landfill	LF6211	Hexane	0.024641
Augusta Landfill	LF6211	Mercury & Compounds	0.0050986
Augusta Landfill	LF6211	Methyl Chloride	0.0026587
Augusta Landfill	LF6211	Methyl Chloroform	0.002787
Augusta Landfill	LF6211	Methyl Ethyl Ketone	0.02225
Augusta Landfill	LF6211	Methyl Isobutyl Ketone	0.0081511
Augusta Landfill	LF6211	Methylene Chloride	0.05286
Augusta Landfill	LF6211	Propylene Dichloride	0.00088502
Augusta Landfill	LF6211	Tetrachloroethylene	0.026919
Augusta Landfill	LF6211	Toluene	0.66156
Augusta Landfill	LF6211	Trichloroethylene	0.016124

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Augusta Landfill	LF6211	Vinyl Chloride	0.019964
Augusta Landfill	LF6211	Vinylidene Chloride	0.00084375
Augusta Landfill	LF6211	Xylenes (Mixture of o, m, and p Isomers)	0.055902
Bath Landfill	LF9870	1,1,2,2-Tetrachloroethane	0.0072131
Bath Landfill	LF9870	1,4-Dichlorobenzene	0.0011951
Bath Landfill	LF9870	Acrylonitrile	0.013003
Bath Landfill	LF9870	Benzene	0.033566
Bath Landfill	LF9870	Carbon Disulfide	0.0017095
Bath Landfill	LF9870	Carbon Tetrachloride	0.047647
Bath Landfill	LF9870	Carbonyl Sulfide	0.0011395
Bath Landfill	LF9870	Chlorobenzene	0.0010894
Bath Landfill	LF9870	Chloroform	0.00013866
Bath Landfill	LF9870	Ethyl Benzene	0.018947
Bath Landfill	LF9870	Ethyl Chloride	0.0031223
Bath Landfill	LF9870	Ethylene Dibromide	0.014547
Bath Landfill	LF9870	Ethylene Dichloride	0.0015708
Bath Landfill	LF9870	Ethylidene Dichloride	0.0090024
Bath Landfill	LF9870	Hexane	0.02192
Bath Landfill	LF9870	Mercury & Compounds	0.0045356
Bath Landfill	LF9870	Methyl Chloride	0.0023652
Bath Landfill	LF9870	Methyl Chloroform	0.0024794
Bath Landfill	LF9870	Methyl Ethyl Ketone	0.019793
Bath Landfill	LF9870	Methyl Isobutyl Ketone	0.0072512
Bath Landfill	LF9870	Methylene Chloride	0.047025
Bath Landfill	LF9870	Propylene Dichloride	0.00078732
Bath Landfill	LF9870	Tetrachloroethylene	0.023947
Bath Landfill	LF9870	Toluene	0.58852
Bath Landfill	LF9870	Trichloroethylene	0.014343
Bath Landfill	LF9870	Vinyl Chloride	0.01776
Bath Landfill	LF9870	Vinylidene Chloride	0.0007506
Bath Landfill	LF9870	Xylenes (Mixture of o, m, and p Isomers)	0.04973
Biddeford Landfill	LF44	1,1,2,2-Tetrachloroethane	0.0048315
Biddeford Landfill	LF44	1,4-Dichlorobenzene	0.00080052
Biddeford Landfill	LF44	Acrylonitrile	0.0087098
Biddeford Landfill	LF44	Benzene	0.022484
Biddeford Landfill	LF44	Carbon Disulfide	0.001145
Biddeford Landfill	LF44	Carbon Tetrachloride	0.031915
Biddeford Landfill	LF44	Carbonyl Sulfide	0.00076329
Biddeford Landfill	LF44	Chlorobenzene	0.00072972
Biddeford Landfill	LF44	Chloroform	0.18576
Biddeford Landfill	LF44	Ethyl Benzene	0.012691
Biddeford Landfill	LF44	Ethyl Chloride	0.0020914
Biddeford Landfill	LF44	Ethylene Dibromide	0.0097442
Biddeford Landfill	LF44	Ethylene Dichloride	0.0010522
Biddeford Landfill	LF44	Ethylidene Dichloride	0.00603
Biddeford Landfill	LF44	Hexane	0.014683
Biddeford Landfill	LF44	Mercury & Compounds	0.003038
Biddeford Landfill	LF44	Methyl Chloride	0.0015843
Biddeford Landfill	LF44	Methyl Chloroform	0.0016607
Biddeford Landfill	LF44	Methyl Ethyl Ketone	0.013258
Biddeford Landfill	LF44	Methyl Isobutyl Ketone	0.004857
Biddeford Landfill	LF44	Methylene Chloride	0.031498
Biddeford Landfill	LF44	Propylene Dichloride	0.00052736
Biddeford Landfill	LF44	Tetrachloroethylene	0.01604
Biddeford Landfill	LF44	Toluene	0.3942

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Biddeford Landfill	LF44	Trichloroethylene	0.0096076
Biddeford Landfill	LF44	Vinyl Chloride	0.011896
Biddeford Landfill	LF44	Vinylidene Chloride	0.00050277
Biddeford Landfill	LF44	Xylenes (Mixture of o, m, and p Isomers)	0.033311
Biw Ebmf (Mallet Land Dr)	500899	Xylenes (Mixture of o, m, and p Isomers)	1029
Biw Re: Hardings Plant	500089	Xylenes (Mixture of o, m, and p Isomers)	5590
Biw Re: Main Yard	2300004	Methyl Isobutyl Ketone	863
Biw Re: Main Yard	2300004	Xylenes (Mixture of o, m, and p Isomers)	12943
Boralex Ashland	300072	2,3,7,8-TCDD TEQ	0.000331328
Boralex Ashland	300072	Acetaldehyde	29.09
Boralex Ashland	300072	Acrolein	17.22
Boralex Ashland	300072	Arsenic & Compounds (Inorganic Including Arsine)	9.11
Boralex Ashland	300072	Benzene	249.1
Boralex Ashland	300072	Beryllium & Compounds	2.85
Boralex Ashland	300072	Cadmium & Compounds	6.44
Boralex Ashland	300072	Chlorine	300.01
Boralex Ashland	300072	Chromium & Compounds	160.01
Boralex Ashland	300072	Ethyl Benzene	19.27
Boralex Ashland	300072	Formaldehyde	545.48
Boralex Ashland	300072	Hydrochloric Acid	26728.44
Boralex Ashland	300072	Lead & Compounds	38.18
Boralex Ashland	300072	Manganese & Compounds	107.1
Boralex Ashland	300072	Mercury & Compounds	7.93
Boralex Ashland	300072	Methyl Chloride	98.91
Boralex Ashland	300072	Methyl Chloroform	26.18
Boralex Ashland	300072	Nickel & Compounds	27.82
Boralex Ashland	300072	Toluene	42.55
Boralex Ashland	300072	Xylenes (Mixture of o, m, and p Isomers)	43.11
Boralex Fort Fairfield	300051	2,3,7,8-TCDD TEQ	0.000538028
Boralex Fort Fairfield	300051	Acetaldehyde	47.24
Boralex Fort Fairfield	300051	Acrolein	27.96
Boralex Fort Fairfield	300051	Arsenic & Compounds (Inorganic Including Arsine)	14.79
Boralex Fort Fairfield	300051	Benzene	404.15
Boralex Fort Fairfield	300051	Beryllium & Compounds	4.64
Boralex Fort Fairfield	300051	Cadmium & Compounds	10.45
Boralex Fort Fairfield	300051	Chlorine	487.18
Boralex Fort Fairfield	300051	Chromium & Compounds	259.83
Boralex Fort Fairfield	300051	Ethyl Benzene	31.3
Boralex Fort Fairfield	300051	Formaldehyde	885.78
Boralex Fort Fairfield	300051	Hydrochloric Acid	43403.13
Boralex Fort Fairfield	300051	Lead & Compounds	62
Boralex Fort Fairfield	300051	Manganese & Compounds	173.91
Boralex Fort Fairfield	300051	Mercury & Compounds	12.87
Boralex Fort Fairfield	300051	Methyl Chloride	160.62
Boralex Fort Fairfield	300051	Methyl Chloroform	42.52
Boralex Fort Fairfield	300051	Nickel & Compounds	45.17
Boralex Fort Fairfield	300051	Polycyclic Organic Matter	0
Boralex Fort Fairfield	300051	Toluene	69.09
Boralex Fort Fairfield	300051	Xylenes (Mixture of o, m, and p Isomers)	70.01
Boralex Livermore Falls	100087	2,3,7,8-TCDD TEQ	0.00058548
Boralex Livermore Falls	100087	Acetaldehyde	51.41
Boralex Livermore Falls	100087	Acrolein	30.43
Boralex Livermore Falls	100087	Arsenic & Compounds (Inorganic	16.1

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
		Including Arsine)	
Boralex Livermore Falls	100087	Benzene	440.18
Boralex Livermore Falls	100087	Beryllium & Compounds	5.05
Boralex Livermore Falls	100087	Cadmium & Compounds	11.37
Boralex Livermore Falls	100087	Chlorine	530.15
Boralex Livermore Falls	100087	Chromium & Compounds	282.74
Boralex Livermore Falls	100087	Ethyl Benzene	34.06
Boralex Livermore Falls	100087	Formaldehyde	963.9
Boralex Livermore Falls	100087	Hydrochloric Acid	47231.1
Boralex Livermore Falls	100087	Lead & Compounds	67.47
Boralex Livermore Falls	100087	Manganese & Compounds	189.25
Boralex Livermore Falls	100087	Mercury & Compounds	14.01
Boralex Livermore Falls	100087	Methyl Chloride	174.79
Boralex Livermore Falls	100087	Methyl Chloroform	46.27
Boralex Livermore Falls	100087	Nickel & Compounds	49.16
Boralex Livermore Falls	100087	Toluene	75.18
Boralex Livermore Falls	100087	Xylenes (Mixture of o, m, and p Isomers)	76.18
Boralex Stratton	700023	2,3,7,8-TCDD TEQ	0.000843232
Boralex Stratton	700023	Acetaldehyde	74.04
Boralex Stratton	700023	Acrolein	43.82
Boralex Stratton	700023	Arsenic & Compounds (Inorganic Including Arsine)	23.18
Boralex Stratton	700023	Benzene	633.97
Boralex Stratton	700023	Beryllium & Compounds	7.27
Boralex Stratton	700023	Cadmium & Compounds	16.38
Boralex Stratton	700023	Chlorine	763.54
Boralex Stratton	700023	Chromium & Compounds	407.22
Boralex Stratton	700023	Ethyl Benzene	49.05
Boralex Stratton	700023	Formaldehyde	1388.25
Boralex Stratton	700023	Hydrochloric Acid	68024.16
Boralex Stratton	700023	Lead & Compounds	97.18
Boralex Stratton	700023	Manganese & Compounds	272.56
Boralex Stratton	700023	Mercury & Compounds	20.18
Boralex Stratton	700023	Methyl Chloride	251.74
Boralex Stratton	700023	Nickel & Compounds	70.8
Boralex Stratton	700023	Toluene	108.28
Boralex Stratton	700023	Xylenes (Mixture of o, m, and p Isomers)	109.72
Brunswick Landfill	LF9462	1,1,2,2-Tetrachloroethane	0.012742
Brunswick Landfill	LF9462	1,4-Dichlorobenzene	0.0021112
Brunswick Landfill	LF9462	Acrylonitrile	0.02297
Brunswick Landfill	LF9462	Benzene	0.059295
Brunswick Landfill	LF9462	Carbon Disulfide	0.0030198
Brunswick Landfill	LF9462	Carbon Tetrachloride	0.084169
Brunswick Landfill	LF9462	Carbonyl Sulfide	0.002013
Brunswick Landfill	LF9462	Chlorobenzene	0.0019245
Brunswick Landfill	LF9462	Chloroform	0.00024495
Brunswick Landfill	LF9462	Ethyl Benzene	0.03347
Brunswick Landfill	LF9462	Ethyl Chloride	0.0055156
Brunswick Landfill	LF9462	Ethylene Dibromide	0.025698
Brunswick Landfill	LF9462	Ethylene Dichloride	0.0027748
Brunswick Landfill	LF9462	Ethylidene Dichloride	0.015903
Brunswick Landfill	LF9462	Hexane	0.038722
Brunswick Landfill	LF9462	Mercury & Compounds	0.0080122
Brunswick Landfill	LF9462	Methyl Chloride	0.0041781
Brunswick Landfill	LF9462	Methyl Chloroform	0.0043798

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Brunswick Landfill	LF9462	Methyl Ethyl Ketone	0.034965
Brunswick Landfill	LF9462	Methyl Isobutyl Ketone	0.012809
Brunswick Landfill	LF9462	Methylene Chloride	0.083069
Brunswick Landfill	LF9462	Propylene Dichloride	0.0013908
Brunswick Landfill	LF9462	Tetrachloroethylene	0.042302
Brunswick Landfill	LF9462	Toluene	1.04
Brunswick Landfill	LF9462	Trichloroethylene	0.025338
Brunswick Landfill	LF9462	Vinyl Chloride	0.031374
Brunswick Landfill	LF9462	Vinylidene Chloride	0.0013259
Brunswick Landfill	LF9462	Xylenes (Mixture of o, m, and p Isomers)	0.087849
Cf Wells	109999	Hexane	1276
Cf Wells	109999	Hexane	1296
Cianbro Fabrication And Coating Corp	2500540	Methyl Isobutyl Ketone	8085
Cianbro Fabrication And Coating Corp	2500540	Xylenes (Mixture of o, m, and p Isomers)	7722
Cives Steel Co., New Eng. Div.	1100540	Methyl Ethyl Ketone	4026
Cives Steel Co., New Eng. Div.	1100540	Xylenes (Mixture of o, m, and p Isomers)	6704
Cold Brook Energy Inc	1900083	Benzene	264
Cold Brook Energy Inc	1900083	Cumene	15
Cold Brook Energy Inc	1900083	Ethyl Benzene	59
Cold Brook Energy Inc	1900083	Hexane	243
Cold Brook Energy Inc	1900083	Methyl Tert-Butyl Ether	4285
Cold Brook Energy Inc	1900083	Toluene	452
Cold Brook Energy Inc	1900083	Xylenes (Mixture of o, m, and p Isomers)	323
Columbia Forest Prod. (Indian Head Plywo	300017	Acetaldehyde	0
Columbia Forest Prod. (Indian Head Plywo	300017	Benzene	246
Columbia Forest Prod. (Indian Head Plywo	300017	Formaldehyde	257
Columbia Forest Prod. (Indian Head Plywo	300017	Formaldehyde	287
Columbia Forest Prod. (Indian Head Plywo	300017	Methanol	642.74
Columbia Forest Prod. (Indian Head Plywo	300017	Methyl Isobutyl Ketone	323.44
Columbia Forest Prod. (Indian Head Plywo	300017	Phenol	31.1
Cyro Industries	3100020	Methyl Ethyl Ketone	264
Cyro Industries	3100020	Methyl Methacrylate	9473
Cyro Industries	3100020	Methylene Chloride	4
Dielectric Comm	500770	Chromium & Compounds	0
Dielectric Comm	500770	Lead & Compounds	0
Dielectric Comm	500770	Nickel & Compounds	0
Dingley Press	100072	Ethylene Glycol	773
Dingley Press	100072	Glycol Ethers	6212
Dingley Press	100072	Methanol	12800
Domtar Maine Corp	2900020	1,2,4-Trichlorobenzene	7524
Domtar Maine Corp	2900020	Acetaldehyde	64850
Domtar Maine Corp	2900020	Arsenic & Compounds (Inorganic Including Arsine)	29
Domtar Maine Corp	2900020	Benzene	569
Domtar Maine Corp	2900020	Cadmium & Compounds	431
Domtar Maine Corp	2900020	Catechol	0
Domtar Maine Corp	2900020	Chlorine	835
Domtar Maine Corp	2900020	Chloroform	2320
Domtar Maine Corp	2900020	Chromium & Compounds	69
Domtar Maine Corp	2900020	Cresol	16000
Domtar Maine Corp	2900020	Formaldehyde	15330
Domtar Maine Corp	2900020	Hexane	2073
Domtar Maine Corp	2900020	Hydrochloric Acid	57490
Domtar Maine Corp	2900020	Lead & Compounds	165
Domtar Maine Corp	2900020	Manganese & Compounds	279

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Domtar Maine Corp	2900020	Methanol	241920
Domtar Maine Corp	2900020	Methyl Ethyl Ketone	6976
Domtar Maine Corp	2900020	Methyl Isobutyl Ketone	2535
Domtar Maine Corp	2900020	Methylene Chloride	1514
Domtar Maine Corp	2900020	Naphthalene	4634
Domtar Maine Corp	2900020	Nickel & Compounds	1091
Domtar Maine Corp	2900020	Phenol	1600
Domtar Maine Corp	2900020	Selenium & Compounds	16
Domtar Maine Corp	2900020	Styrene	2333
Domtar Maine Corp	2900020	Tetrachloroethylene	3257
Domtar Maine Corp	2900020	Toluene	274
Domtar Maine Corp	2900020	Trichloroethylene	498
Dragon Prods. Co. Inc.	T$493	Lead	20.46
Dragon Prods. Co. Inc.	T$493	Lead	11.25
Dragon Prods. Co. Inc.	T$493	Mercury	25.13
Dragon Prods. Co. Inc.	T$493	Mercury	0.01
Dragon Products Co Inc - Thomaston	1300028	Chromium & Compounds	136
Eastern Fine Paper Co. Inc.	1900020	Acetaldehyde	1546
Eastern Fine Paper Co. Inc.	1900020	Chloroform	72
Eastern Fine Paper Co. Inc.	1900020	Formaldehyde	571
Eastern Fine Paper Co. Inc.	1900020	Methylene Chloride	335
Eastern Fine Paper Co. Inc.	1900020	Toluene	12712
Edwards Systems Technology	2500007	Lead & Compounds	2
Edwards Systems Technology	2500007	Toluene	1617
Enefco International, Ltd.	108077	2,4-Toluene Diisocyanate	15294
Exxon/Mobil Oil - Bangor	1900078	Benzene	314
Exxon/Mobil Oil - Bangor	1900078	Ethyl Benzene	51
Exxon/Mobil Oil - Bangor	1900078	Hexane	534
Exxon/Mobil Oil - Bangor	1900078	m-Xylene	241
Exxon/Mobil Oil - Bangor	1900078	Toluene	511
Exxonmobil Oil - Portland Terminal	500123	Benzene	2133
Exxonmobil Oil - Portland Terminal	500123	Ethyl Benzene	263
Exxonmobil Oil - Portland Terminal	500123	Hexane	2417
Exxonmobil Oil - Portland Terminal	500123	m-Xylene	1203
Exxonmobil Oil - Portland Terminal	500123	Toluene	2401
Fairchild Semiconductor Corp.	500053	Catechol	393
Fairchild Semiconductor Corp.	500053	Ethyl Benzene	1060
Fairchild Semiconductor Corp.	500053	Hydrogen Fluoride	655
Fairchild Semiconductor Corp.	500053	Xylenes (Mixture of o, m, and p Isomers)	4498
Falcon Shoe Manufacturing Co.	100690	4,4'-Methylenediphenyl Diisocyanate	1
Falcon Shoe Manufacturing Co.	100690	Methyl Ethyl Ketone	3478
Falcon Shoe Manufacturing Co.	100690	Toluene	3593
Fiber Materials Inc.	3100055	Phenol	309
First Technology/Control Devices	500970	Lead & Compounds	10
Fmc Biopolymer	1300009	Nickel & Compounds	380
Forster Inc. (East Wilton)	700002	Trichloroethylene	1925
Fpl Energy Wyman, Llc	500135	Chromium & Compounds	28
Fpl Energy Wyman, Llc	500135	Formaldehyde	1087
Fpl Energy Wyman, Llc	500135	Hydrochloric Acid	11433
Fpl Energy Wyman, Llc	500135	Hydrochloric Acid	8100
Fpl Energy Wyman, Llc	500135	Hydrogen Fluoride	1229
Fpl Energy Wyman, Llc	500135	Methylene Chloride	205
Fpl Energy Wyman, Llc	500135	Nickel & Compounds	2784
Frenchville Landfill	LF7689	1,1,2,2-Tetrachloroethane	0.0015492
Frenchville Landfill	LF7689	1,4-Dichlorobenzene	0.00025668

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Frenchville Landfill	LF7689	Acrylonitrile	0.0027927
Frenchville Landfill	LF7689	Benzene	0.0072092
Frenchville Landfill	LF7689	Carbon Disulfide	0.00036715
Frenchville Landfill	LF7689	Carbon Tetrachloride	0.010233
Frenchville Landfill	LF7689	Carbonyl Sulfide	0.00024474
Frenchville Landfill	LF7689	Chlorobenzene	0.00023398
Frenchville Landfill	LF7689	Chloroform	0.059563
Frenchville Landfill	LF7689	Ethyl Benzene	0.0040693
Frenchville Landfill	LF7689	Ethyl Chloride	0.0006706
Frenchville Landfill	LF7689	Ethylene Dibromide	0.0031244
Frenchville Landfill	LF7689	Ethylene Dichloride	0.00033737
Frenchville Landfill	LF7689	Ethylidene Dichloride	0.0019335
Frenchville Landfill	LF7689	Hexane	0.0047079
Frenchville Landfill	LF7689	Mercury & Compounds	0.0009742
Frenchville Landfill	LF7689	Methyl Chloride	0.00050798
Frenchville Landfill	LF7689	Methyl Chloroform	0.0005325
Frenchville Landfill	LF7689	Methyl Ethyl Ketone	0.0042511
Frenchville Landfill	LF7689	Methyl Isobutyl Ketone	0.0015574
Frenchville Landfill	LF7689	Methylene Chloride	0.0101
Frenchville Landfill	LF7689	Propylene Dichloride	0.0001691
Frenchville Landfill	LF7689	Tetrachloroethylene	0.0051432
Frenchville Landfill	LF7689	Toluene	0.1264
Frenchville Landfill	LF7689	Trichloroethylene	0.0030806
Frenchville Landfill	LF7689	Vinyl Chloride	0.0038145
Frenchville Landfill	LF7689	Vinylidene Chloride	0.00016121
Frenchville Landfill	LF7689	Xylenes (Mixture of o, m, and p Isomers)	0.010681
General Dynamics Armament And Technical Products	3100013	Chromium & Compounds	1230
General Dynamics Armament And Technical Products	3100013	Manganese & Compounds	26679
General Electric Co. (Bangor Florida Ave)	1900991	Chromium & Compounds	12
General Electric Co. (Bangor Florida Ave)	1900991	Manganese & Compounds	12
General Electric Co. (Bangor Florida Ave)	1900991	Nickel & Compounds	12
General Electric Co. (Bangor)	1900005	Chromium & Compounds	12
General Electric Company	100049	Chromium & Compounds	32
General Electric Company	100049	Cyanide & Compounds	451
General Electric Company	100049	Lead & Compounds	0
General Electric Company	100049	Manganese & Compounds	0
General Electric Company	100049	Nickel & Compounds	4
Georgia-Pacific Corporation	1900034	1,2,4-Trichlorobenzene	5348
Georgia-Pacific Corporation	1900034	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.001
Georgia-Pacific Corporation	1900034	Acetaldehyde	15075
Georgia-Pacific Corporation	1900034	Arsenic & Compounds (Inorganic Including Arsine)	36
Georgia-Pacific Corporation	1900034	Arsenic & Compounds (Inorganic Including Arsine)	14.2
Georgia-Pacific Corporation	1900034	Chlorine	75.3
Georgia-Pacific Corporation	1900034	Chlorine	7534
Georgia-Pacific Corporation	1900034	Chloroform	3343
Georgia-Pacific Corporation	1900034	Chromium & Compounds	48
Georgia-Pacific Corporation	1900034	Chromium & Compounds	27.7
Georgia-Pacific Corporation	1900034	Cresol	7550
Georgia-Pacific Corporation	1900034	Formaldehyde	6397.6
Georgia-Pacific Corporation	1900034	Formaldehyde	6409
Georgia-Pacific Corporation	1900034	Hydrochloric Acid	5487

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Georgia-Pacific Corporation	1900034	Lead & Compounds	66
Georgia-Pacific Corporation	1900034	Lead & Compounds	32.2
Georgia-Pacific Corporation	1900034	Manganese & Compounds	71
Georgia-Pacific Corporation	1900034	Methanol	300205
Georgia-Pacific Corporation	1900034	Methanol	300200
Georgia-Pacific Corporation	1900034	Methyl Ethyl Ketone	3268
Georgia-Pacific Corporation	1900034	Methyl Ethyl Ketone	3584
Georgia-Pacific Corporation	1900034	Naphthalene	940
Georgia-Pacific Corporation	1900034	Nickel & Compounds	2661
Georgia-Pacific Corporation	1900034	Nickel & Compounds	929
Georgia-Pacific Corporation	1900034	Phenol	2313
Georgia-Pacific Corporation	1900034	Styrene	2306
Georgia-Pacific Corporation	1900034	Tetrachloroethylene	1471
Georgia-Pacific Corporation	1900034	Trichloroethylene	234
Greenville Steam Co	2100014	2,3,7,8-TCDD TEQ	0.000280471
Greenville Steam Co	2100014	Acetaldehyde	24.63
Greenville Steam Co	2100014	Acrolein	14.58
Greenville Steam Co	2100014	Arsenic & Compounds (Inorganic Including Arsine)	7.71
Greenville Steam Co	2100014	Benzene	210.87
Greenville Steam Co	2100014	Beryllium & Compounds	2.42
Greenville Steam Co	2100014	Cadmium & Compounds	5.45
Greenville Steam Co	2100014	Chlorine	253.96
Greenville Steam Co	2100014	Chromium & Compounds	135.45
Greenville Steam Co	2100014	Ethyl Benzene	16.32
Greenville Steam Co	2100014	Formaldehyde	461.75
Greenville Steam Co	2100014	Hydrochloric Acid	22625.81
Greenville Steam Co	2100014	Lead & Compounds	32.32
Greenville Steam Co	2100014	Manganese & Compounds	90.66
Greenville Steam Co	2100014	Mercury & Compounds	6.71
Greenville Steam Co	2100014	Methyl Chloride	83.73
Greenville Steam Co	2100014	Methyl Chloroform	22.16
Greenville Steam Co	2100014	Nickel & Compounds	23.55
Greenville Steam Co	2100014	Polycyclic Organic Matter	0
Greenville Steam Co	2100014	Toluene	36.02
Greenville Steam Co	2100014	Xylenes (Mixture of o, m, and p Isomers)	36.5
Gulf Oil Company	500098	Benzene	512
Gulf Oil Company	500098	Ethyl Benzene	518
Gulf Oil Company	500098	Hexane	116
Gulf Oil Company	500098	Methyl Tert-Butyl Ether	3822
Gulf Oil Company	500098	Naphthalene	6208
Gulf Oil Company	500098	Toluene	980
Gulf Oil Company	500098	Xylenes (Mixture of o, m, and p Isomers)	550
H. G. Winter & Sons Inc.	700102	Toluene	2575
Harry Crooker And Sons, Inc.	2300011	Polycyclic Organic Matter	0.1
Harry Crooker And Sons, Inc.	2300011	Xylenes (Mixture of o, m, and p Isomers)	7688
Heritage Salmon Inc.	2902010	Formaldehyde	5000
Hinkley Company - Southwest Harbor	902040	Styrene	6285
Hinkley Company - Southwest Harbor	902040	Xylenes (Mixture of o, m, and p Isomers)	2438
Huhtamaki Foodservice Inc	1100036	Acetaldehyde	241
Huhtamaki Foodservice Inc	1100036	Chloroform	1447
Huhtamaki Foodservice Inc	1100036	Formaldehyde	298
Huhtamaki Foodservice Inc	1100036	Methanol	4265
Indeck West Enfield Energy Center	1900086	2,3,7,8-TCDD TEQ	0.000191347
Indeck West Enfield Energy Center	1900086	Acetaldehyde	17

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Indeck West Enfield Energy Center	1900086	Acrolein	10
Indeck West Enfield Energy Center	1900086	Arsenic & Compounds (Inorganic Including Arsine)	5
Indeck West Enfield Energy Center	1900086	Benzene	144
Indeck West Enfield Energy Center	1900086	Beryllium & Compounds	2
Indeck West Enfield Energy Center	1900086	Cadmium & Compounds	4
Indeck West Enfield Energy Center	1900086	Chlorine	173
Indeck West Enfield Energy Center	1900086	Chromium & Compounds	92
Indeck West Enfield Energy Center	1900086	Dibenzofuran	0
Indeck West Enfield Energy Center	1900086	Ethyl Benzene	11
Indeck West Enfield Energy Center	1900086	Formaldehyde	315
Indeck West Enfield Energy Center	1900086	Hydrochloric Acid	15436
Indeck West Enfield Energy Center	1900086	Lead & Compounds	22
Indeck West Enfield Energy Center	1900086	Manganese & Compounds	62
Indeck West Enfield Energy Center	1900086	Mercury & Compounds	5
Indeck West Enfield Energy Center	1900086	Methyl Chloride	57
Indeck West Enfield Energy Center	1900086	Methyl Chloroform	15
Indeck West Enfield Energy Center	1900086	Nickel & Compounds	16
Indeck West Enfield Energy Center	1900086	Toluene	25
Indeck West Enfield Energy Center	1900086	Xylenes (Mixture of o, m, and p Isomers)	25
International Paper (Bucksport)	900004	Acetaldehyde	9717
International Paper (Bucksport)	900004	Benzene	578
International Paper (Bucksport)	900004	Biphenyl	4839
International Paper (Bucksport)	900004	Formaldehyde	13540
International Paper (Bucksport)	900004	Hydrochloric Acid	37239
International Paper (Bucksport)	900004	Methanol	26002
International Paper (Bucksport)	900004	Methylene Chloride	505
International Paper (Bucksport)	900004	Propionaldehyde	2022
International Paper Co.	T$478	Benzo[g,h,i,]Perylene	0.19
International Paper Co.	T$478	Dioxins	0.2693
International Paper Co.	T$478	Lead & Compounds	8.7
International Paper Co.	T$478	Manganese & Compounds	218
International Paper Co.	T$478	Polycyclic Aromatic Hydrocarbons	49.3
International Paper Co. Andro	700021	Acetaldehyde	64770
International Paper Co. Andro	700021	Arsenic & Compounds (Inorganic Including Arsine)	40
International Paper Co. Andro	700021	Benzene	0
International Paper Co. Andro	700021	Cadmium & Compounds	0
International Paper Co. Andro	700021	Catechol	0
International Paper Co. Andro	700021	Chloroform	8599
International Paper Co. Andro	700021	Chromium & Compounds	69
International Paper Co. Andro	700021	Cresol	12504
International Paper Co. Andro	700021	Cumene	42640
International Paper Co. Andro	700021	Formaldehyde	16322
International Paper Co. Andro	700021	Hydrochloric Acid	512
International Paper Co. Andro	700021	Lead & Compounds	122
International Paper Co. Andro	700021	Lead & Compounds	100
International Paper Co. Andro	700021	Manganese & Compounds	205
International Paper Co. Andro	700021	Manganese & Compounds	200
International Paper Co. Andro	700021	Methanol	186660
International Paper Co. Andro	700021	Methyl Ethyl Ketone	7962
International Paper Co. Andro	700021	Nickel & Compounds	1140
International Paper Co. Andro	700021	Phenol	12688
International Paper Co. Andro	700021	Selenium & Compounds	0
International Paper Co. Andro	700021	Tetrachloroethylene	3480

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
International Paper Co. Andro	700021	Trichloroethylene	16339
Irving Oil Corp.	2700020	Benzene	256
Irving Oil Corp.	2700020	Cumene	4
Irving Oil Corp.	2700020	Ethyl Benzene	56
Irving Oil Corp.	2700020	Hexane	235
Irving Oil Corp.	2700020	Methyl Tert-Butyl Ether	4589
Irving Oil Corp.	2700020	o-Xylene	2
Irving Oil Corp.	2700020	Toluene	479
Irving Oil Corp.	2700020	Xylenes (Mixture of o, m, and p Isomers)	512
Irving Tanning Co.	2500002	Formaldehyde	0.2
Irving Tanning Co.	2500002	Glycol Ethers	37500
Irving Tanning Co.	2500002	Phenol	3020
J. M. Huber Corp.	300048	Acetaldehyde	24800
J. M. Huber Corp.	300048	Acrolein	13400
J. M. Huber Corp.	300048	Dioxins	2.159692165
J. M. Huber Corp.	300048	Formaldehyde	80150
J. M. Huber Corp.	300048	Methanol	67500
J. M. Huber Corp.	300048	Phenol	5000
J. M. Huber Corp.	300048	Propionaldehyde	7500
J.M. Huber Corp.	T$489	4,4'-Methylenediphenyl Diisocyanate	5
J.M. Huber Corp.	T$489	4,4'-Methylenediphenyl Diisocyanate	1160
J.M. Huber Corp.	T$489	Dioxins	0.111
J.M. Huber Corp.	T$489	Lead & Compounds	1.2
J.M. Huber Corp.	T$489	Lead & Compounds	119.1
Johns Manville Corporation	102060	Xylenes (Mixture of o, m, and p Isomers)	4256
Jones And Vining Of Maine	100770	4,4'-Methylenediphenyl Diisocyanate	90
Jones And Vining Of Maine	100770	Ethylene Glycol	6974
Jones And Vining Of Maine	100770	Methylene Chloride	600
Katahdin Analytical Services, Inc.	500810	Methylene Chloride	10486
Katahdin Paper - E. Millinocket	1900058	Chlorine	250
Katahdin Paper - E. Millinocket	1900058	Chloroform	250
Katahdin Paper - E. Millinocket	1900058	Ethylene Glycol	25
Katahdin Paper - E. Millinocket	1900058	Formaldehyde	1500
Katahdin Paper - E. Millinocket	1900058	Manganese & Compounds	420
Katahdin Paper - E. Millinocket	1900058	Nickel & Compounds	2900
Katahdin Paper - Millinocket	1900056	Acetaldehyde	1500
Katahdin Paper - Millinocket	1900056	Chlorine	250
Katahdin Paper - Millinocket	1900056	Chloroform	230
Katahdin Paper - Millinocket	1900056	Manganese & Compounds	400
Katahdin Paper - Millinocket	1900056	Methanol	79000
Katahdin Paper - Millinocket	1900056	Nickel & Compounds	9600
Kenway Corporation	1108095	Styrene	3605
Lewiston Landfill	LF10086	1,1,2,2-Tetrachloroethane	0.010681
Lewiston Landfill	LF10086	1,4-Dichlorobenzene	0.0017697
Lewiston Landfill	LF10086	Acrylonitrile	0.019254
Lewiston Landfill	LF10086	Benzene	0.049704
Lewiston Landfill	LF10086	Carbon Disulfide	0.0025313
Lewiston Landfill	LF10086	Carbon Tetrachloride	0.070554
Lewiston Landfill	LF10086	Carbonyl Sulfide	0.0016874
Lewiston Landfill	LF10086	Chlorobenzene	0.0016132
Lewiston Landfill	LF10086	Chloroform	0.00020533
Lewiston Landfill	LF10086	Ethyl Benzene	0.028056
Lewiston Landfill	LF10086	Ethyl Chloride	0.0046234
Lewiston Landfill	LF10086	Ethylene Dibromide	0.021541
Lewiston Landfill	LF10086	Ethylene Dichloride	0.002326

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Lewiston Landfill	LF10086	Ethylidene Dichloride	0.01333
Lewiston Landfill	LF10086	Hexane	0.032459
Lewiston Landfill	LF10086	Mercury & Compounds	0.0067162
Lewiston Landfill	LF10086	Methyl Chloride	0.0035023
Lewiston Landfill	LF10086	Methyl Chloroform	0.0036713
Lewiston Landfill	LF10086	Methyl Ethyl Ketone	0.029309
Lewiston Landfill	LF10086	Methyl Isobutyl Ketone	0.010737
Lewiston Landfill	LF10086	Methylene Chloride	0.069632
Lewiston Landfill	LF10086	Propylene Dichloride	0.0011658
Lewiston Landfill	LF10086	Tetrachloroethylene	0.035459
Lewiston Landfill	LF10086	Toluene	0.87145
Lewiston Landfill	LF10086	Trichloroethylene	0.021239
Lewiston Landfill	LF10086	Vinyl Chloride	0.026299
Lewiston Landfill	LF10086	Vinylidene Chloride	0.0011115
Lewiston Landfill	LF10086	Xylenes (Mixture of o, m, and p Isomers)	0.073639
Lincoln Pulp & Paper Co. Inc.	T$480	Benzo[g,h,i,]Perylene	1.4
Lincoln Pulp & Paper Co. Inc.	T$480	Chlorine	147
Lincoln Pulp & Paper Co. Inc.	T$480	Dioxins	0.29
Lincoln Pulp & Paper Co. Inc.	T$480	Lead & Compounds	51
Lincoln Pulp & Paper Co. Inc.	T$480	Manganese & Compounds	35
Lincoln Pulp & Paper Co. Inc.	T$480	Polycyclic Aromatic Hydrocarbons	41
Lincoln Pulp And Paper Co Inc	1900023	Acetaldehyde	8869
Lincoln Pulp And Paper Co Inc	1900023	Benzene	885
Lincoln Pulp And Paper Co Inc	1900023	Chromium & Compounds	16
Lincoln Pulp And Paper Co Inc	1900023	Cresol	5271
Lincoln Pulp And Paper Co Inc	1900023	Dioxins	0.57658
Lincoln Pulp And Paper Co Inc	1900023	Formaldehyde	4632
Lincoln Pulp And Paper Co Inc	1900023	Hydrochloric Acid	22320
Lincoln Pulp And Paper Co Inc	1900023	Methanol	214380
Lincoln Pulp And Paper Co Inc	1900023	Methyl Ethyl Ketone	2439
Lincoln Pulp And Paper Co Inc	1900023	Methylene Chloride	150
Lincoln Pulp And Paper Co Inc	1900023	Nickel & Compounds	270
Lincoln Pulp And Paper Co Inc	1900023	Phenol	4351
Lincoln Pulp And Paper Co Inc	1900023	Tetrachloroethylene	951
Louisiana-Pacific - New Limerick	300062	Acetaldehyde	22350
Louisiana-Pacific - New Limerick	300062	Acrolein	6020
Louisiana-Pacific - New Limerick	300062	Benzene	1767
Louisiana-Pacific - New Limerick	300062	Formaldehyde	3982
Louisiana-Pacific - New Limerick	300062	Manganese & Compounds	5702
Louisiana-Pacific - New Limerick	300062	Methanol	21366
Louisiana-Pacific - New Limerick	300062	Phenol	6378
Louisiana-Pacific - New Limerick	300062	Propionaldehyde	1146
Louisiana-Pacific - New Limerick	300062	Toluene	350
Louisiana-Pacific Corp - Woodland Osb	2900021	Acetaldehyde	54247
Louisiana-Pacific Corp - Woodland Osb	2900021	Acrolein	17480
Louisiana-Pacific Corp - Woodland Osb	2900021	Benzene	4931
Louisiana-Pacific Corp - Woodland Osb	2900021	Formaldehyde	20645
Louisiana-Pacific Corp - Woodland Osb	2900021	Manganese & Compounds	13948
Louisiana-Pacific Corp - Woodland Osb	2900021	Methanol	29942
Louisiana-Pacific Corp - Woodland Osb	2900021	Phenol	2450
Louisiana-Pacific Corp - Woodland Osb	2900021	Propionaldehyde	3018
Lyn-Flex Industries	3102010	Toluene	6000
Madison Paper	2500020	Acetaldehyde	3900
Madison Paper	2500020	Biphenyl	13000
Madison Paper	2500020	Cumene	9000

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Madison Paper	2500020	Formaldehyde	1400
Madison Paper	2500020	Methanol	17400
Madison Paper	2500020	Methylene Chloride	690
Madison Paper	2500020	Phenol	19600
Madison Paper	2500020	Toluene	2400
Maine Energy Recovery Company	LMWC-24	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.031452
Maine Energy Recovery Company	LMWC-24	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.032712
Maine Energy Recovery Company	LMWC-24	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.02581
Maine Energy Recovery Company	LMWC-24	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.024815
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0053914
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0056074
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8-Hexachlorodibenzofuran	0.021795
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8-Hexachlorodibenzofuran	0.020956
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.0040281
Maine Energy Recovery Company	LMWC-24	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.0041895
Maine Energy Recovery Company	LMWC-24	1,2,3,6,7,8-Hexachlorodibenzofuran	0.011095
Maine Energy Recovery Company	LMWC-24	1,2,3,6,7,8-Hexachlorodibenzofuran	0.010668
Maine Energy Recovery Company	LMWC-24	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.0049768
Maine Energy Recovery Company	LMWC-24	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.004785
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8,9-Hexachlorodibenzofuran	0.015336
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8,9-Hexachlorodibenzofuran	0.014745
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.0063627
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.0061176
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8-Pentachlorodibenzofuran	0.010122
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8-Pentachlorodibenzofuran	0.009732
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.0040268
Maine Energy Recovery Company	LMWC-24	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.0038717
Maine Energy Recovery Company	LMWC-24	2,3,4,6,7,8-Hexachlorodibenzofuran	0.0085357
Maine Energy Recovery Company	LMWC-24	2,3,4,6,7,8-Hexachlorodibenzofuran	0.0088777
Maine Energy Recovery Company	LMWC-24	2,3,4,7,8-Pentachlorodibenzofuran	0.012354
Maine Energy Recovery Company	LMWC-24	2,3,4,7,8-Pentachlorodibenzofuran	0.011878
Maine Energy Recovery Company	LMWC-24	2,3,7,8-Tetrachlorodibenzofuran	0.0063273
Maine Energy Recovery Company	LMWC-24	2,3,7,8-Tetrachlorodibenzofuran	0.0065809
Maine Energy Recovery Company	LMWC-24	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.0011092
Maine Energy Recovery Company	LMWC-24	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.0011537
Maine Energy Recovery Company	LMWC-24	Cadmium & Compounds	0.0002
Maine Energy Recovery Company	LMWC-24	Cadmium & Compounds	0.00019
Maine Energy Recovery Company	3100078	Ethylene Glycol	0
Maine Energy Recovery Company	LMWC-24	Hydrochloric Acid	1.5
Maine Energy Recovery Company	3100078	Hydrochloric Acid	14.45471
Maine Energy Recovery Company	LMWC-24	Hydrochloric Acid	1.6
Maine Energy Recovery Company	LMWC-24	Lead & Compounds	0.002
Maine Energy Recovery Company	LMWC-24	Lead & Compounds	0.0021
Maine Energy Recovery Company	LMWC-24	Mercury & Compounds	0.00153
Maine Energy Recovery Company	LMWC-24	Mercury & Compounds	0.00159
Maine Energy Recovery Company	LMWC-24	Octachlorodibenzofuran	0.51529
Maine Energy Recovery Company	LMWC-24	Octachlorodibenzofuran	0.53594
Maine Energy Recovery Company	LMWC-24	Octachlorodibenzo-p-Dioxin	0.15994
Maine Energy Recovery Company	LMWC-24	Octachlorodibenzo-p-Dioxin	0.16635
Maine Energy Recovery Company	LMWC-24	Polychlorinated Dibenzofurans	0.45993
Maine Energy Recovery Company	LMWC-24	Polychlorinated Dibenzofurans	0.44221
Maine Energy Recovery Company	LMWC-24	Polychlorinated Dibenzo-P-Dioxins	0.15241
Maine Energy Recovery Company	LMWC-24	Polychlorinated Dibenzo-P-Dioxins	0.15852

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Maine Industrial Repair Service, Inc.	1100082	Xylenes (Mixture of o, m, and p Isomers)	5638
Maine Rs Maintenance Center	308161	Chromium & Compounds	3671
Maine Rs Maintenance Center	308161	Methyl Ethyl Ketone	2131
Maine Rs Maintenance Center	308161	Methyl Isobutyl Ketone	2729
Maine Rs Maintenance Center	308161	Toluene	3705
Maine Rs Maintenance Center	308161	Xylenes (Mixture of o, m, and p Isomers)	4190
Mason Steam	EGU0541	Acenaphthene	0.0020382
Mason Steam	EGU0541	Acenaphthene	0.0031018
Mason Steam	EGU0541	Acenaphthene	0.001861
Mason Steam	EGU0541	Acenaphthylene	0.01016
Mason Steam	EGU0541	Acenaphthylene	0.011068
Mason Steam	EGU0541	Acenaphthylene	0.016874
Mason Steam	EGU0541	Acetaldehyde	0.00023152
Mason Steam	EGU0541	Acetaldehyde	0.00038588
Mason Steam	EGU0541	Acetaldehyde	0.00025358
Mason Steam	EGU0541	Anthracene	0.0001178
Mason Steam	EGU0541	Anthracene	0.0001076
Mason Steam	EGU0541	Anthracene	0.0001794
Mason Steam	EGU0541	Antimony	0.00025358
Mason Steam	EGU0541	Antimony	0.00038588
Mason Steam	EGU0541	Antimony	0.00023152
Mason Steam	EGU0541	Arsenic	0.13621
Mason Steam	EGU0541	Arsenic	0.12436
Mason Steam	EGU0541	Arsenic	0.00010364
Mason Steam	EGU0541	Benz[a]Anthracene	0.0003536
Mason Steam	EGU0541	Benz[a]Anthracene	0.0003874
Mason Steam	EGU0541	Benz[a]Anthracene	0.0005894
Mason Steam	EGU0541	Benzene	0.033075
Mason Steam	EGU0541	Benzene	0.019845
Mason Steam	EGU0541	Benzene	0.021735
Mason Steam	EGU0541	Benzo[b+k]Fluoranthene	0.000143
Mason Steam	EGU0541	Benzo[b+k]Fluoranthene	0.0001306
Mason Steam	EGU0541	Benzo[b+k]Fluoranthene	0.0002176
Mason Steam	EGU0541	Benzo[g,h,i,]Perylene	0.0001994
Mason Steam	EGU0541	Benzo[g,h,i,]Perylene	0.0003322
Mason Steam	EGU0541	Benzo[g,h,i,]Perylene	0.0002184
Mason Steam	EGU0541	Beryllium	0.00441
Mason Steam	EGU0541	Beryllium	0.002898
Mason Steam	EGU0541	Beryllium	0.002646
Mason Steam	EGU0541	Cadmium	0.037044
Mason Steam	EGU0541	Cadmium	0.040572
Mason Steam	EGU0541	Cadmium	0.06174
Mason Steam	EGU0541	Chromium	0.07938
Mason Steam	EGU0541	Chromium	0.08694
Mason Steam	EGU0541	Chromium	0.1323
Mason Steam	EGU0541	Chromium (VI)	0.021874
Mason Steam	EGU0541	Chromium (VI)	0.036456
Mason Steam	EGU0541	Chromium (VI)	0.023957
Mason Steam	EGU0541	Chrysene	0.0003498
Mason Steam	EGU0541	Chrysene	0.00023
Mason Steam	EGU0541	Chrysene	0.00021
Mason Steam	EGU0541	Cobalt	0.00026548
Mason Steam	EGU0541	Cobalt	0.00029077
Mason Steam	EGU0541	Cobalt	0.00044247
Mason Steam	EGU0541	Dibenzo[a,h]Anthracene	0.0001472

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Mason Steam	EGU0541	Dibenzo[a,h]Anthracene	0.0002454
Mason Steam	EGU0541	Dibenzo[a,h]Anthracene	0.0001614
Mason Steam	EGU0541	Ethyl Benzene	0.0061438
Mason Steam	EGU0541	Ethyl Benzene	0.0056096
Mason Steam	EGU0541	Ethyl Benzene	0.0093492
Mason Steam	EGU0541	Fluoranthene	0.0004676
Mason Steam	EGU0541	Fluoranthene	0.0004268
Mason Steam	EGU0541	Fluoranthene	0.0007114
Mason Steam	EGU0541	Fluorene	0.000657
Mason Steam	EGU0541	Fluorene	0.0004318
Mason Steam	EGU0541	Fluorene	0.0003942
Mason Steam	EGU0541	Formaldehyde	0.002646
Mason Steam	EGU0541	Formaldehyde	0.0017388
Mason Steam	EGU0541	Formaldehyde	0.0015876
Mason Steam	EGU0541	Indeno[1,2,3-c,d]Pyrene	0.0003146
Mason Steam	EGU0541	Indeno[1,2,3-c,d]Pyrene	0.0002068
Mason Steam	EGU0541	Indeno[1,2,3-c,d]Pyrene	0.0001888
Mason Steam	EGU0541	Lead	0.14553
Mason Steam	EGU0541	Lead	0.00012128
Mason Steam	EGU0541	Lead	0.15939
Mason Steam	EGU0541	Manganese	0.00013892
Mason Steam	EGU0541	Manganese	0.00023152
Mason Steam	EGU0541	Manganese	0.00015214
Mason Steam	EGU0541	Naphthalene	0.10916
Mason Steam	EGU0541	Naphthalene	0.099666
Mason Steam	EGU0541	Naphthalene	0.16611
Mason Steam	EGU0541	Nickel	0.003969
Mason Steam	EGU0541	Nickel	0.004347
Mason Steam	EGU0541	Nickel	0.006615
Mason Steam	EGU0541	o-Xylene	0.016023
Mason Steam	EGU0541	o-Xylene	0.0096138
Mason Steam	EGU0541	o-Xylene	0.010529
Mason Steam	EGU0541	Phenanthrene	0.000926
Mason Steam	EGU0541	Phenanthrene	0.0015436
Mason Steam	EGU0541	Phenanthrene	0.0010142
Mason Steam	EGU0541	Phosphorus	0.00069531
Mason Steam	EGU0541	Phosphorus	0.00045692
Mason Steam	EGU0541	Phosphorus	0.00041719
Mason Steam	EGU0541	Pyrene	0.0004106
Mason Steam	EGU0541	Pyrene	0.0003748
Mason Steam	EGU0541	Pyrene	0.0006248
Mason Steam	EGU0541	Selenium	0.10804
Mason Steam	EGU0541	Selenium	0.071001
Mason Steam	EGU0541	Selenium	0.064827
Mason Steam	EGU0541	Toluene	0.0004557
Mason Steam	EGU0541	Toluene	0.00029946
Mason Steam	EGU0541	Toluene	0.00027342
Masonite Corporation	100035	Acetaldehyde	722
Masonite Corporation	100035	Formaldehyde	800
Masonite Corporation	100035	Methanol	2531
Masters Machine Company	1500590	Trichloroethylene	31515
Mead Paper Division	1700045	1,2,4-Trichlorobenzene	5470
Mead Paper Division	1700045	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.003
Mead Paper Division	1700045	Acetaldehyde	35900
Mead Paper Division	1700045	Arsenic & Compounds (Inorganic	5

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
		Including Arsine)	
Mead Paper Division	1700045	Benzene	2207
Mead Paper Division	1700045	Beryllium & Compounds	2200
Mead Paper Division	1700045	Cadmium & Compounds	323
Mead Paper Division	1700045	Carbon Disulfide	1000
Mead Paper Division	1700045	Catechol	0
Mead Paper Division	1700045	Chlorine	18
Mead Paper Division	1700045	Chloroacetic Acid	0
Mead Paper Division	1700045	Chloroform	2700
Mead Paper Division	1700045	Chromium & Compounds	43
Mead Paper Division	1700045	Cobalt & Compounds	16
Mead Paper Division	1700045	Cresol	3600
Mead Paper Division	1700045	Cyanide & Compounds	0
Mead Paper Division	1700045	Ethylene Glycol	2
Mead Paper Division	1700045	Formaldehyde	12100
Mead Paper Division	1700045	Hydrogen Fluoride	870
Mead Paper Division	1700045	Lead & Compounds	117
Mead Paper Division	1700045	Manganese & Compounds	130
Mead Paper Division	1700045	Methyl Ethyl Ketone	2800
Mead Paper Division	1700045	Methyl Isobutyl Ketone	1600
Mead Paper Division	1700045	Methylene Chloride	2007
Mead Paper Division	1700045	Naphthalene	3400
Mead Paper Division	1700045	Nickel & Compounds	290
Mead Paper Division	1700045	Phosphorus	0
Mead Paper Division	1700045	Polycyclic Organic Matter	76
Mead Paper Division	1700045	Selenium & Compounds	5
Mead Paper Division	1700045	Styrene	2200
Mead Paper Division	1700045	Tetrachloroethylene	2300
Mega Industries (Gorham)	509904	Chromium & Compounds	3.78
Mid Maine Waste Action Corp.	SMWC-6	1,3-Butadiene	4.95
Mid Maine Waste Action Corp.	SMWC-6	1,4-Dichlorobenzene	50.78
Mid Maine Waste Action Corp.	SMWC-6	2,3,7,8-TCDD TEQ	0.0024374
Mid Maine Waste Action Corp.	SMWC-6	2,3,7,8-TCDD TEQ	0.0024374
Mid Maine Waste Action Corp.	SMWC-6	Arsenic & Compounds (Inorganic Including Arsine)	0.56
Mid Maine Waste Action Corp.	SMWC-6	Benzene	37.46
Mid Maine Waste Action Corp.	SMWC-6	Beryllium & Compounds	0.06
Mid Maine Waste Action Corp.	SMWC-6	Cadmium & Compounds	0.00050094
Mid Maine Waste Action Corp.	SMWC-6	Cadmium & Compounds	0.000285
Mid Maine Waste Action Corp.	SMWC-6	Cadmium & Compounds	0.000285
Mid Maine Waste Action Corp.	SMWC-6	Cadmium & Compounds	0.00050094
Mid Maine Waste Action Corp.	SMWC-6	Carbon Tetrachloride	6.5
Mid Maine Waste Action Corp.	SMWC-6	Chromium & Compounds	1.98
Mid Maine Waste Action Corp.	SMWC-6	Ethyl Benzene	134.06
Mid Maine Waste Action Corp.	SMWC-6	Ethyl Chloride	1.24
Mid Maine Waste Action Corp.	SMWC-6	Hexane	66.57
Mid Maine Waste Action Corp.	SMWC-6	Hydrochloric Acid	3.904
Mid Maine Waste Action Corp.	SMWC-6	Hydrochloric Acid	0.532435
Mid Maine Waste Action Corp.	SMWC-6	Hydrochloric Acid	3.904
Mid Maine Waste Action Corp.	SMWC-6	Hydrochloric Acid	0.532435
Mid Maine Waste Action Corp.	SMWC-6	Lead & Compounds	0.0030625
Mid Maine Waste Action Corp.	SMWC-6	Lead & Compounds	0.0048252
Mid Maine Waste Action Corp.	SMWC-6	Lead & Compounds	0.0048252
Mid Maine Waste Action Corp.	SMWC-6	Lead & Compounds	0.0030625
Mid Maine Waste Action Corp.	SMWC-6	Mercury & Compounds	0.029688

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Mid Maine Waste Action Corp.	SMWC-6	Mercury & Compounds	0.0008825
Mid Maine Waste Action Corp.	SMWC-6	Mercury & Compounds	0.029688
Mid Maine Waste Action Corp.	SMWC-6	Mercury & Compounds	0.0008825
Mid Maine Waste Action Corp.	SMWC-6	Nickel & Compounds	2.96
Mid Maine Waste Action Corp.	SMWC-6	o-Xylene	117.03
Mid Maine Waste Action Corp.	SMWC-6	Styrene	71.21
Mid Maine Waste Action Corp.	SMWC-6	Tetrachloroethylene	190.1
Mid Maine Waste Action Corp.	SMWC-6	Toluene	863.19
Mid Maine Waste Action Corp.	SMWC-6	Trichloroethylene	284.22
Mid Maine Waste Action Corp.	SMWC-6	Vinylidene Chloride	21.36
Mid Maine Waste Action Corp.	SMWC-6	Xylenes (Mixture of o, m, and p Isomers)	419.83
Morin Brick Co	BSCP113	Antimony & Compounds	0.0042961
Morin Brick Co	BSCP79	Antimony & Compounds	0.0022555
Morin Brick Co	BSCP113	Arsenic & Compounds (Inorganic Including Arsine)	0.0023446
Morin Brick Co	BSCP79	Arsenic & Compounds (Inorganic Including Arsine)	0.0012309
Morin Brick Co	BSCP113	Beryllium & Compounds	0.14895
Morin Brick Co	BSCP79	Beryllium & Compounds	0.078199
Morin Brick Co	BSCP113	Cadmium & Compounds	0.00052271
Morin Brick Co	BSCP79	Cadmium & Compounds	0.00027442
Morin Brick Co	BSCP79	Chromium & Compounds	0.0010789
Morin Brick Co	BSCP113	Chromium & Compounds	0.002055
Morin Brick Co	BSCP79	Cobalt & Compounds	0.00021722
Morin Brick Co	BSCP113	Cobalt & Compounds	0.00041375
Morin Brick Co	BSCP113	Hydrochloric Acid	5.186
Morin Brick Co	BSCP79	Hydrochloric Acid	2.723
Morin Brick Co	500165	Hydrogen Fluoride	28200
Morin Brick Co	100051	Hydrogen Fluoride	33400
Morin Brick Co	BSCP79	Hydrogen Fluoride	4.224
Morin Brick Co	BSCP113	Hydrogen Fluoride	8.045
Morin Brick Co	BSCP79	Lead & Compounds	0.004453
Morin Brick Co	BSCP113	Lead & Compounds	0.0084819
Morin Brick Co	BSCP79	Manganese & Compounds	0.0074579
Morin Brick Co	BSCP113	Manganese & Compounds	0.014205
Morin Brick Co	BSCP79	Mercury & Compounds	0.00038376
Morin Brick Co	BSCP113	Mercury & Compounds	0.00073096
Morin Brick Co	BSCP79	Nickel & Compounds	0.0008906
Morin Brick Co	BSCP113	Nickel & Compounds	0.0016964
Morin Brick Co	BSCP79	Selenium & Compounds	0.0025379
Morin Brick Co	BSCP113	Selenium & Compounds	0.004834
Morris Yachts	900780	Lead & Compounds	0
Morris Yachts	900780	Styrene	1264
National Starch And Chemical Corp.	300063	1-Chloro-2,3-Epoxypropane	2
National Starch And Chemical Corp.	300063	Propylene Oxide	1114
National Wood Products	1708115	Bis(2-Ethylhexyl)Phthalate	213
National Wood Products	1708115	Ethyl Benzene	2479
National Wood Products	1708115	Toluene	2331
National Wood Products	1708115	Xylenes (Mixture of o, m, and p Isomers)	8456
Naval Computer & Telecommunications Station-Cutler Me	2900003	Benzene	145
Nexfor Fraser Paper Inc.	300027	Chloroform	7627
Nexfor Fraser Paper Inc.	300027	Methanol	7865
Nichols Portland	501290	Nickel & Compounds	0
Norridgewock Landfill & Transfer Station	LF1547	1,1,2,2-Tetrachloroethane	0.0086991

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Norridgewock Landfill & Transfer Station	LF1547	1,4-Dichlorobenzene	0.0014413
Norridgewock Landfill & Transfer Station	LF1547	Acrylonitrile	0.015682
Norridgewock Landfill & Transfer Station	LF1547	Benzene	0.040482
Norridgewock Landfill & Transfer Station	LF1547	Carbon Disulfide	0.0020616
Norridgewock Landfill & Transfer Station	LF1547	Carbon Tetrachloride	0.057463
Norridgewock Landfill & Transfer Station	LF1547	Carbonyl Sulfide	0.0013743
Norridgewock Landfill & Transfer Station	LF1547	Chlorobenzene	0.0013139
Norridgewock Landfill & Transfer Station	LF1547	Chloroform	0.00016723
Norridgewock Landfill & Transfer Station	LF1547	Ethyl Benzene	0.02285
Norridgewock Landfill & Transfer Station	LF1547	Ethyl Chloride	0.0037656
Norridgewock Landfill & Transfer Station	LF1547	Ethylene Dibromide	0.017544
Norridgewock Landfill & Transfer Station	LF1547	Ethylene Dichloride	0.0018944
Norridgewock Landfill & Transfer Station	LF1547	Ethylidene Dichloride	0.010857
Norridgewock Landfill & Transfer Station	LF1547	Hexane	0.026436
Norridgewock Landfill & Transfer Station	LF1547	Mercury & Compounds	0.00547
Norridgewock Landfill & Transfer Station	LF1547	Methyl Chloride	0.0028525
Norridgewock Landfill & Transfer Station	LF1547	Methyl Chloroform	0.0029901
Norridgewock Landfill & Transfer Station	LF1547	Methyl Ethyl Ketone	0.023871
Norridgewock Landfill & Transfer Station	LF1547	Methyl Isobutyl Ketone	0.0087451
Norridgewock Landfill & Transfer Station	LF1547	Methylene Chloride	0.056712
Norridgewock Landfill & Transfer Station	LF1547	Propylene Dichloride	0.00094952
Norridgewock Landfill & Transfer Station	LF1547	Tetrachloroethylene	0.02888
Norridgewock Landfill & Transfer Station	LF1547	Toluene	0.70976
Norridgewock Landfill & Transfer Station	LF1547	Trichloroethylene	0.017298
Norridgewock Landfill & Transfer Station	LF1547	Vinyl Chloride	0.021419
Norridgewock Landfill & Transfer Station	LF1547	Vinylidene Chloride	0.00090524
Norridgewock Landfill & Transfer Station	LF1547	Xylenes (Mixture of o, m, and p Isomers)	0.059976
North End Composites	1300790	Styrene	31800
Osram Sylvania Inc	1900018	Methanol	14491
Osram Sylvania Inc	1900018	Nickel & Compounds	1.98
Penobscot Energy Recovery	LMWC-25	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.010857
Penobscot Energy Recovery	LMWC-25	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.011049
Penobscot Energy Recovery	LMWC-25	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.018255
Penobscot Energy Recovery	LMWC-25	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.017938
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0025963
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0026422
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8-Hexachlorodibenzofuran	0.008261
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8-Hexachlorodibenzofuran	0.0084069
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.0014412
Penobscot Energy Recovery	LMWC-25	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.0014162
Penobscot Energy Recovery	LMWC-25	1,2,3,6,7,8-Hexachlorodibenzofuran	0.0047206
Penobscot Energy Recovery	LMWC-25	1,2,3,6,7,8-Hexachlorodibenzofuran	0.0048039
Penobscot Energy Recovery	LMWC-25	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.0033044
Penobscot Energy Recovery	LMWC-25	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.0033628
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8,9-Hexachlorodibenzofuran	0.0014412
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8,9-Hexachlorodibenzofuran	0.0014162
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.0033628
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.0033044
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8-Pentachlorodibenzofuran	0.0047206
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8-Pentachlorodibenzofuran	0.0048039
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.0014162
Penobscot Energy Recovery	LMWC-25	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.0014412
Penobscot Energy Recovery	1900093	1,3-Butadiene	17.98

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Penobscot Energy Recovery	1900093	1,4-Dichlorobenzene	184.29
Penobscot Energy Recovery	LMWC-25	2,3,4,6,7,8-Hexachlorodibenzofuran	0.0048039
Penobscot Energy Recovery	LMWC-25	2,3,4,6,7,8-Hexachlorodibenzofuran	0.0047206
Penobscot Energy Recovery	LMWC-25	2,3,4,7,8-Pentachlorodibenzofuran	0.0054286
Penobscot Energy Recovery	LMWC-25	2,3,4,7,8-Pentachlorodibenzofuran	0.0055245
Penobscot Energy Recovery	LMWC-25	2,3,7,8-Tetrachlorodibenzofuran	0.012971
Penobscot Energy Recovery	LMWC-25	2,3,7,8-Tetrachlorodibenzofuran	0.012746
Penobscot Energy Recovery	LMWC-25	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.00070808
Penobscot Energy Recovery	LMWC-25	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.00072059
Penobscot Energy Recovery	1900093	Benzene	135.97
Penobscot Energy Recovery	1900093	Beryllium & Compounds	0.11
Penobscot Energy Recovery	1900093	Cadmium & Compounds	0.00033
Penobscot Energy Recovery	LMWC-25	Cadmium & Compounds	0.00041
Penobscot Energy Recovery	LMWC-25	Cadmium & Compounds	0.00041
Penobscot Energy Recovery	1900093	Cadmium & Compounds	0.00033
Penobscot Energy Recovery	1900093	Carbon Tetrachloride	23.6
Penobscot Energy Recovery	1900093	Chromium & Compounds	28
Penobscot Energy Recovery	1900093	Chromium & Compounds	31.74
Penobscot Energy Recovery	1900093	Ethyl Benzene	486.58
Penobscot Energy Recovery	1900093	Ethyl Chloride	4.49
Penobscot Energy Recovery	1900093	Hexane	241.6
Penobscot Energy Recovery	1900093	Hydrochloric Acid	5.73789
Penobscot Energy Recovery	1900093	Hydrochloric Acid	5.73789
Penobscot Energy Recovery	LMWC-25	Hydrochloric Acid	8.8
Penobscot Energy Recovery	LMWC-25	Hydrochloric Acid	8.6
Penobscot Energy Recovery	LMWC-25	Lead & Compounds	0.0044
Penobscot Energy Recovery	LMWC-25	Lead & Compounds	0.0043
Penobscot Energy Recovery	LMWC-25	Mercury & Compounds	0.00195
Penobscot Energy Recovery	LMWC-25	Mercury & Compounds	0.00199
Penobscot Energy Recovery	LMWC-25	Octachlorodibenzofuran	0.0084069
Penobscot Energy Recovery	LMWC-25	Octachlorodibenzofuran	0.008261
Penobscot Energy Recovery	LMWC-25	Octachlorodibenzo-p-Dioxin	0.021858
Penobscot Energy Recovery	LMWC-25	Octachlorodibenzo-p-Dioxin	0.021479
Penobscot Energy Recovery	LMWC-25	Polychlorinated Dibenzofurans	0.15973
Penobscot Energy Recovery	LMWC-25	Polychlorinated Dibenzofurans	0.15696
Penobscot Energy Recovery	LMWC-25	Polychlorinated Dibenzo-P-Dioxins	0.09752
Penobscot Energy Recovery	LMWC-25	Polychlorinated Dibenzo-P-Dioxins	0.095827
Pioneer Plastics Corporation	100027	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.019
Pioneer Plastics Corporation	100027	Ethylene Glycol	1878
Pioneer Plastics Corporation	100027	Formaldehyde	20576
Pioneer Plastics Corporation	100027	Maleic Anhydride	500
Pioneer Plastics Corporation	100027	Methanol	74108
Pioneer Plastics Corporation	100027	Methylene Chloride	144
Pioneer Plastics Corporation	100027	Naphthalene	2
Pioneer Plastics Corporation	100027	Nickel & Compounds	131
Pioneer Plastics Corporation	100027	Phenol	22917
Pioneer Plastics Corporation	100027	Phthalic Anhydride	500
Pioneer Plastics Corporation	100027	Polycyclic Organic Matter	0
Portsmouth Naval Shipyard	3100053	Chromium & Compounds	2
Portsmouth Naval Shipyard	3100053	Lead & Compounds	2.55
Portsmouth Naval Shipyard	3100053	Nickel & Compounds	12
Portsmouth Naval Shipyard	3100053	Xylenes (Mixture of o, m, and p Isomers)	3265
Pratt And Whitney	3100029	Cobalt & Compounds	40
Pratt And Whitney	3100029	Manganese & Compounds	1
Pratt And Whitney	3100029	Methyl Ethyl Ketone	2918

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Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Pratt And Whitney	3100029	Methyl Methacrylate	1
Pratt And Whitney	3100029	Nickel & Compounds	320
Pratt And Whitney	3100029	Polycyclic Organic Matter	0
Pratt And Whitney	3100029	Tetrachloroethylene	4
Pratt And Whitney	3100029	Toluene	1626
Presque Isle Landfill	LF10011	1,1,2,2-Tetrachloroethane	0.0019969
Presque Isle Landfill	LF10011	1,4-Dichlorobenzene	0.00033087
Presque Isle Landfill	LF10011	Acrylonitrile	0.0035999
Presque Isle Landfill	LF10011	Benzene	0.0092928
Presque Isle Landfill	LF10011	Carbon Disulfide	0.00047326
Presque Isle Landfill	LF10011	Carbon Tetrachloride	0.013191
Presque Isle Landfill	LF10011	Carbonyl Sulfide	0.00031548
Presque Isle Landfill	LF10011	Chlorobenzene	0.00030161
Presque Isle Landfill	LF10011	Chloroform	0.076778
Presque Isle Landfill	LF10011	Ethyl Benzene	0.0052454
Presque Isle Landfill	LF10011	Ethyl Chloride	0.00086442
Presque Isle Landfill	LF10011	Ethylene Dibromide	0.0040274
Presque Isle Landfill	LF10011	Ethylene Dichloride	0.00043487
Presque Isle Landfill	LF10011	Ethylidene Dichloride	0.0024923
Presque Isle Landfill	LF10011	Hexane	0.0060686
Presque Isle Landfill	LF10011	Mercury & Compounds	0.0012556
Presque Isle Landfill	LF10011	Methyl Chloride	0.0006548
Presque Isle Landfill	LF10011	Methyl Chloroform	0.0006864
Presque Isle Landfill	LF10011	Methyl Ethyl Ketone	0.0054797
Presque Isle Landfill	LF10011	Methyl Isobutyl Ketone	0.0020075
Presque Isle Landfill	LF10011	Methylene Chloride	0.013019
Presque Isle Landfill	LF10011	Propylene Dichloride	0.00021797
Presque Isle Landfill	LF10011	Tetrachloroethylene	0.0066296
Presque Isle Landfill	LF10011	Toluene	0.16293
Presque Isle Landfill	LF10011	Trichloroethylene	0.003971
Presque Isle Landfill	LF10011	Vinyl Chloride	0.0049169
Presque Isle Landfill	LF10011	Vinylidene Chloride	0.0002078
Presque Isle Landfill	LF10011	Xylenes (Mixture of o, m, and p Isomers)	0.013768
Pride Mfg. Company	2100590	Naphthalene	4800
Prime Tanning Co.	3100028	Chromium & Compounds	0
Prime Tanning Co.	3100028	Glycol Ethers	5767
Regional Waste Systems Inc	LMWC-23	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.072543
Regional Waste Systems Inc	LMWC-23	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.15389
Regional Waste Systems Inc	LMWC-23	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.35834
Regional Waste Systems Inc	LMWC-23	1,2,3,4,6,7,8-Heptachlorodibenzo-p-Dioxin	0.055823
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01309
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0091547
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8-Hexachlorodibenzofuran	0.098454
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8-Hexachlorodibenzofuran	0.050494
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.013853
Regional Waste Systems Inc	LMWC-23	1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin	0.0052354
Regional Waste Systems Inc	LMWC-23	1,2,3,6,7,8-Hexachlorodibenzofuran	0.050146
Regional Waste Systems Inc	LMWC-23	1,2,3,6,7,8-Hexachlorodibenzofuran	0.027785
Regional Waste Systems Inc	LMWC-23	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.0082977
Regional Waste Systems Inc	LMWC-23	1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin	0.036874
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8,9-Hexachlorodibenzofuran	0.0024246
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8,9-Hexachlorodibenzofuran	0.02453
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.0427

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Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin	0.012061
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8-Pentachlorodibenzofuran	0.035318
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8-Pentachlorodibenzofuran	0.057433
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.0090164
Regional Waste Systems Inc	LMWC-23	1,2,3,7,8-Pentachlorodibenzo-p-Dioxin	0.016045
Regional Waste Systems Inc	LMWC-23	1,3-Butadiene	13.23
Regional Waste Systems Inc	LMWC-23	1,4-Dichlorobenzene	135.57
Regional Waste Systems Inc	LMWC-23	2,3,4,6,7,8-Hexachlorodibenzofuran	0.028079
Regional Waste Systems Inc	LMWC-23	2,3,4,6,7,8-Hexachlorodibenzofuran	0.053714
Regional Waste Systems Inc	LMWC-23	2,3,4,7,8-Pentachlorodibenzofuran	0.034795
Regional Waste Systems Inc	LMWC-23	2,3,4,7,8-Pentachlorodibenzofuran	0.06918
Regional Waste Systems Inc	LMWC-23	2,3,7,8-Tetrachlorodibenzofuran	0.17216
Regional Waste Systems Inc	LMWC-23	2,3,7,8-Tetrachlorodibenzofuran	0.083259
Regional Waste Systems Inc	LMWC-23	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.0079058
Regional Waste Systems Inc	LMWC-23	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.0047268
Regional Waste Systems Inc	EM3432	7-PAH	0.0011396
Regional Waste Systems Inc	EM3432	Arsenic & Compounds (Inorganic Including Arsine)	0.0011396
Regional Waste Systems Inc	EM3432	Arsenic & Compounds (Inorganic Including Arsine)	0.1253
Regional Waste Systems Inc	LMWC-23	Benzene	100.02
Regional Waste Systems Inc	LMWC-23	Beryllium & Compounds	0.21
Regional Waste Systems Inc	LMWC-23	Cadmium & Compounds	0.003185
Regional Waste Systems Inc	LMWC-23	Cadmium & Compounds	0.00175
Regional Waste Systems Inc	LMWC-23	Cadmium & Compounds	0.00759
Regional Waste Systems Inc	LMWC-23	Carbon Tetrachloride	17.36
Regional Waste Systems Inc	LMWC-23	Chromium & Compounds	19
Regional Waste Systems Inc	LMWC-23	Ethyl Benzene	397.53
Regional Waste Systems Inc	EM3432	Formaldehyde	0.13286
Regional Waste Systems Inc	LMWC-23	Hydrochloric Acid	7.7
Regional Waste Systems Inc	LMWC-23	Hydrochloric Acid	3.2
Regional Waste Systems Inc	LMWC-23	Hydrochloric Acid	16.4475
Regional Waste Systems Inc	LMWC-23	Lead & Compounds	0.036455
Regional Waste Systems Inc	LMWC-23	Lead & Compounds	0.0221
Regional Waste Systems Inc	LMWC-23	Lead & Compounds	0.069
Regional Waste Systems Inc	EM3432	Manganese & Compounds	0.0011396
Regional Waste Systems Inc	LMWC-23	Mercury & Compounds	0.00345
Regional Waste Systems Inc	LMWC-23	Mercury & Compounds	0.0105
Regional Waste Systems Inc	LMWC-23	Mercury & Compounds	0.0148
Regional Waste Systems Inc	EM3432	Nickel & Compounds	0.01433
Regional Waste Systems Inc	EM3432	Nickel & Compounds	0.022459
Regional Waste Systems Inc	LMWC-23	Octachlorodibenzofuran	0.02927
Regional Waste Systems Inc	LMWC-23	Octachlorodibenzofuran	0.038643
Regional Waste Systems Inc	LMWC-23	Octachlorodibenzo-p-Dioxin	0.13032
Regional Waste Systems Inc	LMWC-23	Octachlorodibenzo-p-Dioxin	0.8171
Regional Waste Systems Inc	LMWC-23	Polychlorinated Dibenzofurans	2.6859
Regional Waste Systems Inc	LMWC-23	Polychlorinated Dibenzofurans	1.3363
Regional Waste Systems Inc	LMWC-23	Polychlorinated Dibenzo-P-Dioxins	0.32941
Regional Waste Systems Inc	LMWC-23	Polychlorinated Dibenzo-P-Dioxins	1.47
Regional Waste Systems, Inc.	500142	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.019
Rich Tool & Die	500577	Chromium & Compounds	1
Rich Tool & Die	500577	Cobalt & Compounds	1
Rich Tool & Die	500577	Nickel & Compounds	1
Robinson Manufacturing Co.	1700013	Diethanolamine	0
S. D. Warren - Westbrook	500138	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.00126

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Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
S. D. Warren - Westbrook	500138	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0
S. D. Warren - Westbrook	500138	Acetaldehyde	539
S. D. Warren - Westbrook	500138	Arsenic & Compounds (Inorganic Including Arsine)	4
S. D. Warren - Westbrook	500138	Benzene	375
S. D. Warren - Westbrook	500138	Chromium & Compounds	213
S. D. Warren - Westbrook	500138	Formaldehyde	4656
S. D. Warren - Westbrook	500138	Glycol Ethers	28055
S. D. Warren - Westbrook	500138	Hydrochloric Acid	45858
S. D. Warren - Westbrook	500138	Hydrogen Fluoride	10038
S. D. Warren - Westbrook	500138	Lead & Compounds	5
S. D. Warren - Westbrook	500138	Manganese & Compounds	923.14
S. D. Warren - Westbrook	500138	Manganese & Compounds	73
S. D. Warren - Westbrook	500138	Methanol	16662
S. D. Warren - Westbrook	500138	Methylene Chloride	5754
S. D. Warren - Westbrook	500138	Nickel & Compounds	217
S. D. Warren - Westbrook	500138	Selenium & Compounds	2
S. D. Warren - Westbrook	500138	Tetrachloroethylene	5151
S. D. Warren - Westbrook	500138	Toluene	10275
S. D. Warren - Westbrook	500138	Triethylamine	12380
Sabre Corporation	500101	Methyl Methacrylate	1547
Sabre Corporation	500101	Styrene	6558
Saco Landfill	LF43	1,1,2,2-Tetrachloroethane	0.029665
Saco Landfill	LF43	1,4-Dichlorobenzene	0.0049152
Saco Landfill	LF43	Acrylonitrile	0.053478
Saco Landfill	LF43	Benzene	0.13805
Saco Landfill	LF43	Carbon Disulfide	0.0070305
Saco Landfill	LF43	Carbon Tetrachloride	0.19596
Saco Landfill	LF43	Carbonyl Sulfide	0.0046866
Saco Landfill	LF43	Chlorobenzene	0.0044805
Saco Landfill	LF43	Chloroform	0.00057029
Saco Landfill	LF43	Ethyl Benzene	0.077923
Saco Landfill	LF43	Ethyl Chloride	0.012841
Saco Landfill	LF43	Ethylene Dibromide	0.059829
Saco Landfill	LF43	Ethylene Dichloride	0.0064602
Saco Landfill	LF43	Ethylidene Dichloride	0.037024
Saco Landfill	LF43	Hexane	0.090152
Saco Landfill	LF43	Mercury & Compounds	0.018654
Saco Landfill	LF43	Methyl Chloride	0.0097274
Saco Landfill	LF43	Methyl Chloroform	0.010197
Saco Landfill	LF43	Methyl Ethyl Ketone	0.081404
Saco Landfill	LF43	Methyl Isobutyl Ketone	0.029822
Saco Landfill	LF43	Methylene Chloride	0.1934
Saco Landfill	LF43	Propylene Dichloride	0.003238
Saco Landfill	LF43	Tetrachloroethylene	0.098486
Saco Landfill	LF43	Toluene	2.42
Saco Landfill	LF43	Trichloroethylene	0.058991
Saco Landfill	LF43	Vinyl Chloride	0.073043
Saco Landfill	LF43	Vinylidene Chloride	0.003087
Saco Landfill	LF43	Xylenes (Mixture of o, m, and p Isomers)	0.20453
Samina Sci Corp (E-M Solutions)	500129	Nickel & Compounds	2962
Samina Sci Corp (E-M Solutions)	500129	Toluene	2715
Samina Sci Corp (E-M Solutions)	500129	Xylenes (Mixture of o, m, and p Isomers)	3066
Sappi (S. D. Warren - Somerset)	2500027	1,2,4-Trichlorobenzene	12800
Sappi (S. D. Warren - Somerset)	2500027	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	0.002618

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Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Sappi (S. D. Warren - Somerset)	2500027	2,4,6-Trichlorophenol	60
Sappi (S. D. Warren - Somerset)	2500027	Acetaldehyde	40500
Sappi (S. D. Warren - Somerset)	2500027	Arsenic & Compounds (Inorganic Including Arsine)	68
Sappi (S. D. Warren - Somerset)	2500027	Benzene	2600
Sappi (S. D. Warren - Somerset)	2500027	Cadmium & Compounds	335
Sappi (S. D. Warren - Somerset)	2500027	Carbon Disulfide	1670
Sappi (S. D. Warren - Somerset)	2500027	Catechol	0
Sappi (S. D. Warren - Somerset)	2500027	Chlorine	0
Sappi (S. D. Warren - Somerset)	2500027	Chloroacetic Acid	0
Sappi (S. D. Warren - Somerset)	2500027	Chloroform	4400
Sappi (S. D. Warren - Somerset)	2500027	Chromium & Compounds	2300
Sappi (S. D. Warren - Somerset)	2500027	Cresol	303
Sappi (S. D. Warren - Somerset)	2500027	Cumene	80
Sappi (S. D. Warren - Somerset)	2500027	Formaldehyde	20525
Sappi (S. D. Warren - Somerset)	2500027	Hexane	4790
Sappi (S. D. Warren - Somerset)	2500027	Hydrochloric Acid	133000
Sappi (S. D. Warren - Somerset)	2500027	Hydrogen Fluoride	11
Sappi (S. D. Warren - Somerset)	2500027	Lead & Compounds	117
Sappi (S. D. Warren - Somerset)	2500027	Manganese & Compounds	1700
Sappi (S. D. Warren - Somerset)	2500027	Methanol	213300
Sappi (S. D. Warren - Somerset)	2500027	Methyl Ethyl Ketone	3980
Sappi (S. D. Warren - Somerset)	2500027	Methyl Isobutyl Ketone	3760
Sappi (S. D. Warren - Somerset)	2500027	Methylene Chloride	8205
Sappi (S. D. Warren - Somerset)	2500027	Naphthalene	8820
Sappi (S. D. Warren - Somerset)	2500027	Nickel & Compounds	2700
Sappi (S. D. Warren - Somerset)	2500027	Phenol	250
Sappi (S. D. Warren - Somerset)	2500027	Selenium & Compounds	1160
Sappi (S. D. Warren - Somerset)	2500027	Styrene	3700
Sappi (S. D. Warren - Somerset)	2500027	Tetrachloroethylene	4480
Sappi (S. D. Warren - Somerset)	2500027	Toluene	880
Sappi (S. D. Warren - Somerset)	2500027	Xylenes (Mixture of o, m, and p Isomers)	2800
Sas Pittsfield, Inc.	2500008	Methyl Ethyl Ketone	4252
Sas Pittsfield, Inc.	2500008	Toluene	7625
Saunders Manufacturing Co. Inc.	1100720	Glycol Ethers	9502
Sawyer Environmental Recovery Facility (Serf)	LF3282	1,1,2,2-Tetrachloroethane	0.013107
Sawyer Environmental Recovery Facility (Serf)	LF3282	1,4-Dichlorobenzene	0.0021718
Sawyer Environmental Recovery Facility (Serf)	LF3282	Acrylonitrile	0.023629
Sawyer Environmental Recovery Facility (Serf)	LF3282	Benzene	0.060996
Sawyer Environmental Recovery Facility (Serf)	LF3282	Carbon Disulfide	0.0031064
Sawyer Environmental Recovery Facility (Serf)	LF3282	Carbon Tetrachloride	0.086583
Sawyer Environmental Recovery Facility (Serf)	LF3282	Carbonyl Sulfide	0.0020708
Sawyer Environmental Recovery Facility (Serf)	LF3282	Chlorobenzene	0.0019797
Sawyer Environmental Recovery Facility (Serf)	LF3282	Chloroform	0.00025198
Sawyer Environmental Recovery Facility (Serf)	LF3282	Ethyl Benzene	0.03443
Sawyer Environmental Recovery Facility (Serf)	LF3282	Ethyl Chloride	0.0056739
Sawyer Environmental Recovery Facility (Serf)	LF3282	Ethylene Dibromide	0.026435
Sawyer Environmental Recovery Facility (Serf)	LF3282	Ethylene Dichloride	0.0028544
Sawyer Environmental Recovery Facility (Serf)	LF3282	Ethylidene Dichloride	0.016359
Sawyer Environmental Recovery Facility (Serf)	LF3282	Hexane	0.039833
Sawyer Environmental Recovery Facility (Serf)	LF3282	Mercury & Compounds	0.0082422
Sawyer Environmental Recovery Facility (Serf)	LF3282	Methyl Chloride	0.004298
Sawyer Environmental Recovery Facility (Serf)	LF3282	Methyl Chloroform	0.0045054
Sawyer Environmental Recovery Facility (Serf)	LF3282	Methyl Ethyl Ketone	0.035968
Sawyer Environmental Recovery Facility (Serf)	LF3282	Methyl Isobutyl Ketone	0.013177

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Sawyer Environmental Recovery Facility (Serf)	LF3282	Methylene Chloride	0.085452
Sawyer Environmental Recovery Facility (Serf)	LF3282	Propylene Dichloride	0.0014307
Sawyer Environmental Recovery Facility (Serf)	LF3282	Tetrachloroethylene	0.043516
Sawyer Environmental Recovery Facility (Serf)	LF3282	Toluene	1.069
Sawyer Environmental Recovery Facility (Serf)	LF3282	Trichloroethylene	0.026065
Sawyer Environmental Recovery Facility (Serf)	LF3282	Vinyl Chloride	0.032274
Sawyer Environmental Recovery Facility (Serf)	LF3282	Vinylidene Chloride	0.001364
Sawyer Environmental Recovery Facility (Serf)	LF3282	Xylenes (Mixture of o, m, and p Isomers)	0.090369
Sci Technology, Inc.	1100073	Glycol Ethers	22
Sci Technology, Inc.	1100073	Lead & Compounds	0
Sebago Inc. (Cumberland)	502120	Toluene	5035
Sermatech International, Inc.	3108168	Methyl Ethyl Ketone	800
Silvex Inc.	501550	Chromium & Compounds	41
Silvex Inc.	501550	Cyanide & Compounds	560
Silvex Inc.	501550	Nickel & Compounds	46
Smith & Wesson Division	300670	Lead & Compounds	0
South Portland Landfill	LF8512	1,1,2,2-Tetrachloroethane	0.00062815
South Portland Landfill	LF8512	1,4-Dichlorobenzene	0.00010408
South Portland Landfill	LF8512	Acrylonitrile	0.0011324
South Portland Landfill	LF8512	Benzene	0.0029231
South Portland Landfill	LF8512	Carbon Disulfide	0.00014887
South Portland Landfill	LF8512	Carbon Tetrachloride	0.0041494
South Portland Landfill	LF8512	Carbonyl Sulfide	0.19847
South Portland Landfill	LF8512	Chlorobenzene	0.18975
South Portland Landfill	LF8512	Chloroform	0.024151
South Portland Landfill	LF8512	Ethyl Benzene	0.00165
South Portland Landfill	LF8512	Ethyl Chloride	0.00027191
South Portland Landfill	LF8512	Ethylene Dibromide	0.0012668
South Portland Landfill	LF8512	Ethylene Dichloride	0.00013679
South Portland Landfill	LF8512	Ethylidene Dichloride	0.00078398
South Portland Landfill	LF8512	Hexane	0.0019089
South Portland Landfill	LF8512	Mercury & Compounds	0.000395
South Portland Landfill	LF8512	Methyl Chloride	0.00020597
South Portland Landfill	LF8512	Methyl Chloroform	0.00021591
South Portland Landfill	LF8512	Methyl Ethyl Ketone	0.0017237
South Portland Landfill	LF8512	Methyl Isobutyl Ketone	0.00063147
South Portland Landfill	LF8512	Methylene Chloride	0.0040951
South Portland Landfill	LF8512	Propylene Dichloride	0.13713
South Portland Landfill	LF8512	Tetrachloroethylene	0.0020854
South Portland Landfill	LF8512	Toluene	0.051251
South Portland Landfill	LF8512	Trichloroethylene	0.0012491
South Portland Landfill	LF8512	Vinyl Chloride	0.0015467
South Portland Landfill	LF8512	Vinylidene Chloride	0.13073
South Portland Landfill	LF8512	Xylenes (Mixture of o, m, and p Isomers)	0.0043308
Southern Maine Specialties	3108167	Chromium & Compounds	0
Spencer Press Of Maine Inc.	3100067	Ethylene Glycol	8250
Spencer Press Of Maine Inc.	3100067	Glycol Ethers	33918
Spencer Press Of Maine Inc.	3100067	Methanol	19117
Sprague Energy Corp (Cumberland)	500120	Benzene	26
Sprague Energy Corp (Cumberland)	500120	Toluene	1
Sprague Sanford Inc.	3100051	Ethylene Glycol	1088
Tambrands Inc.	100084	Vinyl Acetate	817
The Hinckley Company - Trenton	908162	Methyl Methacrylate	3020
The Hinckley Company - Trenton	908162	Styrene	11665
Tri-Community Recycling & Sanitary Landfill	LF7794	1,1,2,2-Tetrachloroethane	0.0058917

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Tri-Community Recycling & Sanitary Landfill	LF7794	1,4-Dichlorobenzene	0.00097618
Tri-Community Recycling & Sanitary Landfill	LF7794	Acrylonitrile	0.010621
Tri-Community Recycling & Sanitary Landfill	LF7794	Benzene	0.027417
Tri-Community Recycling & Sanitary Landfill	LF7794	Carbon Disulfide	0.0013963
Tri-Community Recycling & Sanitary Landfill	LF7794	Carbon Tetrachloride	0.038918
Tri-Community Recycling & Sanitary Landfill	LF7794	Carbonyl Sulfide	0.00093078
Tri-Community Recycling & Sanitary Landfill	LF7794	Chlorobenzene	0.00088985
Tri-Community Recycling & Sanitary Landfill	LF7794	Chloroform	0.00011326
Tri-Community Recycling & Sanitary Landfill	LF7794	Ethyl Benzene	0.015476
Tri-Community Recycling & Sanitary Landfill	LF7794	Ethyl Chloride	0.0025503
Tri-Community Recycling & Sanitary Landfill	LF7794	Ethylene Dibromide	0.011882
Tri-Community Recycling & Sanitary Landfill	LF7794	Ethylene Dichloride	0.001283
Tri-Community Recycling & Sanitary Landfill	LF7794	Ethylidene Dichloride	0.0073532
Tri-Community Recycling & Sanitary Landfill	LF7794	Hexane	0.017905
Tri-Community Recycling & Sanitary Landfill	LF7794	Mercury & Compounds	0.0037048
Tri-Community Recycling & Sanitary Landfill	LF7794	Methyl Chloride	0.0019319
Tri-Community Recycling & Sanitary Landfill	LF7794	Methyl Chloroform	0.0020251
Tri-Community Recycling & Sanitary Landfill	LF7794	Methyl Ethyl Ketone	0.016167
Tri-Community Recycling & Sanitary Landfill	LF7794	Methyl Isobutyl Ketone	0.0059229
Tri-Community Recycling & Sanitary Landfill	LF7794	Methylene Chloride	0.03841
Tri-Community Recycling & Sanitary Landfill	LF7794	Propylene Dichloride	0.00064309
Tri-Community Recycling & Sanitary Landfill	LF7794	Tetrachloroethylene	0.01956
Tri-Community Recycling & Sanitary Landfill	LF7794	Toluene	0.48071
Tri-Community Recycling & Sanitary Landfill	LF7794	Trichloroethylene	0.011716
Tri-Community Recycling & Sanitary Landfill	LF7794	Vinyl Chloride	0.014507
Tri-Community Recycling & Sanitary Landfill	LF7794	Vinylidene Chloride	0.0006131
Tri-Community Recycling & Sanitary Landfill	LF7794	Xylenes (Mixture of o, m, and p Isomers)	0.04062
University Of Maine - Orono	01900NEW	Methylene Chloride	755
Wahlcometroflex	100550	Chromium & Compounds	0
Wahlcometroflex	100550	Manganese & Compounds	0
Wahlcometroflex	100550	Nickel & Compounds	0
Wausau Moisinee Paper Corporation Otis Mill	700007	1,3-Butadiene	0.0033058
Wausau Moisinee Paper Corporation Otis Mill	700007	1,3-Butadiene	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Acetaldehyde	0.050484581
Wausau Moisinee Paper Corporation Otis Mill	700007	Acetaldehyde	0.0043363
Wausau Moisinee Paper Corporation Otis Mill	700007	Acrolein	0.024669604
Wausau Moisinee Paper Corporation Otis Mill	700007	Acrolein	0.00052163
Wausau Moisinee Paper Corporation Otis Mill	700007	Acrylamide	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Acrylamide	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Acrylic Acid	0.0138
Wausau Moisinee Paper Corporation Otis Mill	700007	Antimony & Compounds	0.0198
Wausau Moisinee Paper Corporation Otis Mill	700007	Arsenic & Compounds (Inorganic Including Arsine)	0.00497
Wausau Moisinee Paper Corporation Otis Mill	700007	Arsenic & Compounds (Inorganic Including Arsine)	6.07
Wausau Moisinee Paper Corporation Otis Mill	700007	Benzene	0.0008168
Wausau Moisinee Paper Corporation Otis Mill	700007	Benzene	10.4
Wausau Moisinee Paper Corporation Otis Mill	700007	Beryllium & Compounds	0.000105
Wausau Moisinee Paper Corporation Otis Mill	700007	Beryllium & Compounds	1.26
Wausau Moisinee Paper Corporation Otis Mill	700007	Cadmium & Compounds	0.0015
Wausau Moisinee Paper Corporation Otis Mill	700007	Cadmium & Compounds	6.93
Wausau Moisinee Paper Corporation Otis Mill	700007	Chlorine	2438.65
Wausau Moisinee Paper Corporation Otis Mill	700007	Chromium & Compounds	35.45
Wausau Moisinee Paper Corporation Otis Mill	700007	Chromium & Compounds	0.00318
Wausau Moisinee Paper Corporation Otis Mill	700007	Cobalt & Compounds	0.0227

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
Wausau Moisinee Paper Corporation Otis Mill	700007	Ethyl Acrylate	0.000686
Wausau Moisinee Paper Corporation Otis Mill	700007	Ethyl Benzene	0.00023906
Wausau Moisinee Paper Corporation Otis Mill	700007	Ethyl Benzene	0.36
Wausau Moisinee Paper Corporation Otis Mill	700007	Ethylene Glycol	0.137
Wausau Moisinee Paper Corporation Otis Mill	700007	Formaldehyde	88.06
Wausau Moisinee Paper Corporation Otis Mill	700007	Formaldehyde	0.12404
Wausau Moisinee Paper Corporation Otis Mill	700007	Glycol Ethers	864
Wausau Moisinee Paper Corporation Otis Mill	700007	Glycol Ethers	0.431
Wausau Moisinee Paper Corporation Otis Mill	700007	Hydrochloric Acid	80.16
Wausau Moisinee Paper Corporation Otis Mill	700007	Hydrogen Fluoride	0.0079417
Wausau Moisinee Paper Corporation Otis Mill	700007	Manganese & Compounds	1569.32
Wausau Moisinee Paper Corporation Otis Mill	700007	Manganese & Compounds	0.0113
Wausau Moisinee Paper Corporation Otis Mill	700007	Mercury & Compounds	0.1
Wausau Moisinee Paper Corporation Otis Mill	700007	Mercury & Compounds	0.000425
Wausau Moisinee Paper Corporation Otis Mill	700007	Methanol	0.008
Wausau Moisinee Paper Corporation Otis Mill	700007	Methyl Chloroform	0.00088821
Wausau Moisinee Paper Corporation Otis Mill	700007	Methyl Chloroform	1.21
Wausau Moisinee Paper Corporation Otis Mill	700007	Methyl Isobutyl Ketone	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Methylene Chloride	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Naphthalene	0.004252
Wausau Moisinee Paper Corporation Otis Mill	700007	Nickel & Compounds	2325.75
Wausau Moisinee Paper Corporation Otis Mill	700007	Nickel & Compounds	0.318
Wausau Moisinee Paper Corporation Otis Mill	700007	Polycyclic Organic Matter	0.004895
Wausau Moisinee Paper Corporation Otis Mill	700007	Selenium & Compounds	0.00257
Wausau Moisinee Paper Corporation Otis Mill	700007	Styrene	0.0288
Wausau Moisinee Paper Corporation Otis Mill	700007	Styrene	0
Wausau Moisinee Paper Corporation Otis Mill	700007	Toluene	44.6
Wausau Moisinee Paper Corporation Otis Mill	700007	Toluene	0.02331
Wausau Moisinee Paper Corporation Otis Mill	700007	Xylenes (Mixture of o, m, and p Isomers)	1265.05
Wausau Moisinee Paper Corporation Otis Mill	700007	Xylenes (Mixture of o, m, and p Isomers)	0.00041365
Webber Tanks Inc. (Brewer)	1900079	Benzene	5
Webber Tanks Inc. (Brewer)	1900079	Ethyl Benzene	11
Webber Tanks Inc. (Brewer)	1900079	Hexane	7
Webber Tanks Inc. (Brewer)	1900079	Toluene	52
Webber Tanks Inc. (Brewer)	1900079	Xylenes (Mixture of o, m, and p Isomers)	70
Webber Tanks, Inc. (Bucksport)	900019	Benzene	140
Webber Tanks, Inc. (Bucksport)	900019	Cumene	4
Webber Tanks, Inc. (Bucksport)	900019	Ethyl Benzene	76
Webber Tanks, Inc. (Bucksport)	900019	Hexane	142
Webber Tanks, Inc. (Bucksport)	900019	Toluene	394
Webber Tanks, Inc. (Bucksport)	900019	Xylenes (Mixture of o, m, and p Isomers)	463
West Point Stevens Inc.	3100004	Formaldehyde	15098
Wheelabrator-Sherman Energy Co	1900055	2,3,7,8-TCDD TEQ	0.000227378
Wheelabrator-Sherman Energy Co	1900055	Acetaldehyde	19.96
Wheelabrator-Sherman Energy Co	1900055	Acrolein	11.82
Wheelabrator-Sherman Energy Co	1900055	Arsenic & Compounds (Inorganic Including Arsine)	6.25
Wheelabrator-Sherman Energy Co	1900055	Benzene	170.95
Wheelabrator-Sherman Energy Co	1900055	Beryllium & Compounds	1.96
Wheelabrator-Sherman Energy Co	1900055	Cadmium & Compounds	4.42
Wheelabrator-Sherman Energy Co	1900055	Chlorine	205.89
Wheelabrator-Sherman Energy Co	1900055	Chromium & Compounds	109.81
Wheelabrator-Sherman Energy Co	1900055	Dibenzofuran	0.0002
Wheelabrator-Sherman Energy Co	1900055	Ethyl Benzene	13.23
Wheelabrator-Sherman Energy Co	1900055	Formaldehyde	374.34

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005

Facility Name	NEI Unique ID	Pollutant Name	Emissions (tpy)
Wheelabrator-Sherman Energy Co	1900055	Hydrochloric Acid	18342.73
Wheelabrator-Sherman Energy Co	1900055	Lead & Compounds	26.2
Wheelabrator-Sherman Energy Co	1900055	Manganese & Compounds	73.5
Wheelabrator-Sherman Energy Co	1900055	Mercury & Compounds	5.44
Wheelabrator-Sherman Energy Co	1900055	Methyl Chloride	67.88
Wheelabrator-Sherman Energy Co	1900055	Methyl Chloroform	17.97
Wheelabrator-Sherman Energy Co	1900055	Nickel & Compounds	19.09
Wheelabrator-Sherman Energy Co	1900055	Polycyclic Organic Matter	0
Wheelabrator-Sherman Energy Co	1900055	Toluene	29.2
Wheelabrator-Sherman Energy Co	1900055	Xylenes (Mixture of o, m, and p Isomers)	29.59
Wilbur Yachts	900840	Styrene	537
William F Wyman	EGU0533	Acenaphthene	0.015774
William F Wyman	EGU0533	Acenaphthene	0.020294
William F Wyman	EGU0533	Acenaphthene	0.00023086
William F Wyman	EGU0533	Acenaphthene	0.098545
William F Wyman	EGU0533	Acenaphthylene	0.0011816
William F Wyman	EGU0533	Acenaphthylene	0.0001892
William F Wyman	EGU0533	Acenaphthylene	0.0055362
William F Wyman	EGU0533	Acenaphthylene	0.0002434
William F Wyman	EGU0533	Acetaldehyde	0.01226
William F Wyman	EGU0533	Acetaldehyde	0.0025247
William F Wyman	EGU0533	Acetaldehyde	0.05744
William F Wyman	EGU0533	Acetaldehyde	0.0019624
William F Wyman	EGU0533	Anthracene	0.026696
William F Wyman	EGU0533	Anthracene	0.0011734
William F Wyman	EGU0533	Anthracene	0.000912
William F Wyman	EGU0533	Anthracene	0.0056978
William F Wyman	EGU0533	Antimony	0.0019624
William F Wyman	EGU0533	Antimony	0.0025247
William F Wyman	EGU0533	Antimony	0.05744
William F Wyman	EGU0533	Antimony	0.01226
William F Wyman	EGU0533	Arsenic	0.00067807
William F Wyman	EGU0533	Arsenic	0.015427
William F Wyman	EGU0533	Arsenic	0.00052706
William F Wyman	EGU0533	Arsenic	0.0032926
William F Wyman	EGU0533	Benz[a]Anthracene	0.087747
William F Wyman	EGU0533	Benz[a]Anthracene	0.0038568
William F Wyman	EGU0533	Benz[a]Anthracene	0.018728
William F Wyman	EGU0533	Benz[a]Anthracene	0.0029978
William F Wyman	EGU0533	Benzene	0.0024617
William F Wyman	EGU0533	Benzene	0.16821
William F Wyman	EGU0533	Benzene	0.0001082
William F Wyman	EGU0533	Benzene	0.00052542
William F Wyman	EGU0533	Benzo[b+k]Fluoranthene	0.0014234
William F Wyman	EGU0533	Benzo[b+k]Fluoranthene	0.0069122
William F Wyman	EGU0533	Benzo[b+k]Fluoranthene	0.032385
William F Wyman	EGU0533	Benzo[b+k]Fluoranthene	0.0011064
William F Wyman	EGU0533	Benzo[g,h,i,]Perylene	0.049453
William F Wyman	EGU0533	Benzo[g,h,i,]Perylene	0.0016896
William F Wyman	EGU0533	Benzo[g,h,i,]Perylene	0.0021736
William F Wyman	EGU0533	Benzo[g,h,i,]Perylene	0.010555
William F Wyman	EGU0533	Beryllium	0.14011
William F Wyman	EGU0533	Beryllium	0.028854
William F Wyman	EGU0533	Beryllium	0.00032823
William F Wyman	EGU0533	Beryllium	0.022428

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
William F Wyman	EGU0533	Cadmium	0.00020198
William F Wyman	EGU0533	Cadmium	0.0045952
William F Wyman	EGU0533	Cadmium	0.00098078
William F Wyman	EGU0533	Cadmium	0.000157
William F Wyman	EGU0533	Chromium	0.00033642
William F Wyman	EGU0533	Chromium	0.00043281
William F Wyman	EGU0533	Chromium	0.0021017
William F Wyman	EGU0533	Chromium	0.0098469
William F Wyman	EGU0533	Chromium (VI)	0.1854
William F Wyman	EGU0533	Chromium (VI)	0.00011926
William F Wyman	EGU0533	Chromium (VI)	0.0027134
William F Wyman	EGU0533	Chromium (VI)	0.00057913
William F Wyman	EGU0533	Chrysene	0.002289
William F Wyman	EGU0533	Chrysene	0.011116
William F Wyman	EGU0533	Chrysene	0.0017792
William F Wyman	EGU0533	Chrysene	0.052079
William F Wyman	EGU0533	Cobalt	0.002895
William F Wyman	EGU0533	Cobalt	0.065865
William F Wyman	EGU0533	Cobalt	0.0022503
William F Wyman	EGU0533	Cobalt	0.014058
William F Wyman	EGU0533	Dibenzo[a,h]Anthracene	0.0077996
William F Wyman	EGU0533	Dibenzo[a,h]Anthracene	0.0012484
William F Wyman	EGU0533	Dibenzo[a,h]Anthracene	0.036543
William F Wyman	EGU0533	Dibenzo[a,h]Anthracene	0.0016062
William F Wyman	EGU0533	Ethyl Benzene	0.00069585
William F Wyman	EGU0533	Ethyl Benzene	0.06117
William F Wyman	EGU0533	Ethyl Benzene	0.00014852
William F Wyman	EGU0533	Ethyl Benzene	0.047547
William F Wyman	EGU0533	Fluoranthene	0.0046552
William F Wyman	EGU0533	Fluoranthene	0.0036184
William F Wyman	EGU0533	Fluoranthene	0.022605
William F Wyman	EGU0533	Fluoranthene	0.10591
William F Wyman	EGU0533	Fluorene	0.097813
William F Wyman	EGU0533	Fluorene	0.0042992
William F Wyman	EGU0533	Fluorene	0.020877
William F Wyman	EGU0533	Fluorene	0.0033418
William F Wyman	EGU0533	Formaldehyde	0.017312
William F Wyman	EGU0533	Formaldehyde	0.084067
William F Wyman	EGU0533	Formaldehyde	0.013457
William F Wyman	EGU0533	Formaldehyde	0.39388
William F Wyman	EGU0533	Indeno[1,2,3-c,d]Pyrene	0.046827
William F Wyman	EGU0533	Indeno[1,2,3-c,d]Pyrene	0.0099946
William F Wyman	EGU0533	Indeno[1,2,3-c,d]Pyrene	0.0015998
William F Wyman	EGU0533	Indeno[1,2,3-c,d]Pyrene	0.0020582
William F Wyman	EGU0533	Lead	0.0038531
William F Wyman	EGU0533	Lead	0.00079348
William F Wyman	EGU0533	Lead	0.00061677
William F Wyman	EGU0533	Lead	0.018053
William F Wyman	EGU0533	Manganese	0.0011775
William F Wyman	EGU0533	Manganese	0.0015148
William F Wyman	EGU0533	Manganese	0.034464
William F Wyman	EGU0533	Manganese	0.0073559
William F Wyman	EGU0533	Naphthalene	0.0026388
William F Wyman	EGU0533	Naphthalene	0.012363
William F Wyman	EGU0533	Naphthalene	0.00042239

Appendix C: Maine Point Source HAP emissions, by Facility, as filed on 5/01/2005			
Facility Name	**NEI Unique ID**	**Pollutant Name**	**Emissions (tpy)**
William F Wyman	EGU0533	Naphthalene	0.00054342
William F Wyman	EGU0533	Nickel	0.98469
William F Wyman	EGU0533	Nickel	0.043281
William F Wyman	EGU0533	Nickel	0.033642
William F Wyman	EGU0533	Nickel	0.21017
William F Wyman	EGU0533	o-Xylene	0.0011926
William F Wyman	EGU0533	o-Xylene	0.00025454
William F Wyman	EGU0533	o-Xylene	0.081488
William F Wyman	EGU0533	o-Xylene	0.10484
William F Wyman	EGU0533	Phenanthrene	0.00011488
William F Wyman	EGU0533	Phenanthrene	0.0078498
William F Wyman	EGU0533	Phenanthrene	0.010099
William F Wyman	EGU0533	Phenanthrene	0.049039
William F Wyman	EGU0533	Phosphorus	0.022091
William F Wyman	EGU0533	Phosphorus	0.0045493
William F Wyman	EGU0533	Phosphorus	0.0035361
William F Wyman	EGU0533	Phosphorus	0.1035
William F Wyman	EGU0533	Pyrene	0.0040876
William F Wyman	EGU0533	Pyrene	0.0031772
William F Wyman	EGU0533	Pyrene	0.092999
William F Wyman	EGU0533	Pyrene	0.019849
William F Wyman	EGU0533	Selenium	0.0017164
William F Wyman	EGU0533	Selenium	0.00035346
William F Wyman	EGU0533	Selenium	0.00027474
William F Wyman	EGU0533	Selenium	0.0080416
William F Wyman	EGU0533	Toluene	0.067834
William F Wyman	EGU0533	Toluene	0.014478
William F Wyman	EGU0533	Toluene	0.0029816
William F Wyman	EGU0533	Toluene	0.0023176
Wise Business Forms (Frmly EPX Group)	501840	Benzene	1068

Appendix D: Maine DEP Air Licenses That Have Been Transferred Between January 1, 1990 and June 1, 2004

Maine DEP License No	Name of Facility	Maine Town That Facility is Located in	Change Requested on
000027	MONTREAL, MAINE & ATLANTIC RAILWAY LTD	MILO	03/25/2003
	BANGOR & AROOSTOOK RAILROAD CO	MILO	02/13/2002
000062	HUBER ENGINEERED WOODS LLC	EASTON	01/09/2004
	J M HUBER CORP	EASTON	02/24/1993
000088	BUMBLE BEE SEAFOODS LLC-BATH	BATH	03/04/2004
	STINSON SEAFOOD (2001) INC	BATH	11/20/2001
	STINSON SEAFOOD 2000 INC	BATH	02/29/2000
	STINSON SEAFOOD COMPANY, LP	BATH	04/15/1994
000104	KNIGHT-CELOTEX LLC	LISBON FALLS	12/15/2003
	WOOD FIBER INDUSTRIES	LISBON	11/25/1991
	MASONITE CORP	LISBON	09/15/1986
	UNITED STATES GYPSUM CO	LISBON	10/23/1984
000126	LOUISIANA-PACIFIC CORP	BAILEYVILLE	02/12/2003
	GEORGIA-PACIFIC CORP	WOODLAND	06/17/1993
000177	LINCOLN PAPER & TISSUE LLC	LINCOLN	04/16/2004
	LINCOLN PULP & PAPER CO INC	LINCOLN	06/26/1996
000195	AUGUSTA TISSUE LLC	AUGUSTA	04/16/2003
	AMERICAN TISSUE MILLS OF MAINE LLC	AUGUSTA	11/10/1999
	TREE-FREE FIBER CO LLC	AUGUSTA	03/04/1996
	STATLER INDUSTRIES, INC	AUGUSTA	02/24/1993
000207	FUTUREGUARD BUILDING PRODUCTS INC	AUBURN	08/20/2003
	101 MERROW ROAD LLC	AUBURN	08/06/2002
	AUBURN SHOE CO/DIV SHAER SHOE CORP	AUBURN	05/07/1996
	SHAER SHOE CORP	AUBURN	07/30/1991
	AUBURN SHOE CO	AUBURN	07/26/1990
	ETONIC, INC	AUBURN	04/16/1985
000217	MAINE INDUSTRIAL REPAIR SERVICES INC	AUGUSTA	04/02/2003
	EASTERN ELECTRIC APPARATUS REPAIR CO	AUGUSTA	09/24/1999
	WESTINGHOUSE ELECTRIC CORP	AUGUSTA	07/11/1985
000263	ANTONIO LEVESQUE & SONS INC	MADAWASKA	06/04/2004
	FRASER PAPER, LTD	MADAWASKA	12/20/1984
000296	HALEY CONST INC-FARMINGTON	FARMINGTON	09/29/2003
	DRAGON PRODUCTS CO INC	FARMINGTON	07/27/1998
000342	J & L ELECTRIC	STRONG	07/01/2003
	FORSTER MFG CO INC	STRONG	11/01/2001
000389	DAAQUAM MAINE INC	COSTIGAN	07/24/2003
	CHAMPION INTL CORP	COSTIGAN	06/25/1987
000405	KATAHDIN PAPER CO LLC	EAST MILLINOCKET	04/02/2003
	GREAT NORTHERN PAPER, INC	EAST MILLINOCKET	10/14/1992
000406	KATAHDIN PAPER CO LLC	MILLINOCKET	04/02/2003
	GREAT NORTHERN PAPER INC	MILLINOCKET	02/21/1996
000472	BUMBLE BEE SEAFOODS LLC-PROSPECT HARBOR	PROSPECT HARBOR	03/04/2004
	STINSON SEAFOOD (2001) INC	PROSPECT HARBOR	11/20/2001
	STINSON SEAFOOD 2000 INC	GOULDSBORO	02/29/2000
	STINSON SEAFOOD COMPANY	GOULDSBORO	11/30/1993

MAINE DEP License No	Name of Facility	Maine Town That Facility is Located in	Change Requested on
000506	THE DINGLEY PRESS INC	LISBON	06/01/2004
	THE DINGLEY PRESS	LISBON	09/17/1998
000565	ELMET TECHNOLOGIES INC	LEWISTON	12/17/2003
	PHILIPS ELMET	LEWISTON	12/15/1994
000571	477 CONGRESS LLC	PORTLAND	10/14/2003
	OCTOBER CORP	PORTLAND	06/30/1995
	CROWN LIFE INSURANCE CO	PORTLAND	01/05/1995
000653	SEBAGO USA LLC	WESTBROOK	10/03/2003
	SEBAGO INC	WESTBROOK	10/10/1997
000678	FORMED FIBER TECHNOLOGIES INC	AUBURN	09/04/2003
	GATES FORMED-FIBRE PRODUCTS INC	AUBURN	09/10/1996
000753	ZEMCO INDUSTRIES INC	PORTLAND	09/29/2003
	JORDAN'S MEATS CORP	PORTLAND	09/10/1998

Appendix E: Maine DEP Air License That Have Expired or Been Surrendered Between January 1, 1990 and June 1, 2004

DEP License#	COMPANY NAME	LOCATION	COMMENTS
A-000790-71- A-N	A & M PARTNERS LLC	PORTLAND	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; TO BE PROCESSED AS COMBINATION NEW LICENSE & TRANSFER OF LIC; NO LIC OR TRANSFER FEE PD
A-000661-74- A-N	AMERICAN ASH RECYCLING FACILITY	SCARBOROUGH	(LIC HAS BEEN PUT IN INACTIVE FILE)
A-000105-74- C-R	APOLLO TANNING LTD	CAMDEN	APPLICATION WAS NOT PHYSICALLY RETURNED TO APPLICANT; AIR EMISSION LIC FILE FOLDER HAS BEEN PUT IN INACTIVE LIC FILE-SEE 3/16/2000 LTR IN LIC FILE
A-000304-74- E-N	ARCHIE'S INC	PERU	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000041-71- E-R	BAILEY MFG CORP	FRYEBURG	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000379-71- G-R	BANGOR & AROOSTOOK RR CO	HERMON	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: STEVE JOHNSTON/SUPT-MOTIVE POWER @ (207) 848-4210; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000050-71- I-R	BATH IRON WORKS CORP	PORTLAND	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000172-70- A-I	BEAVER WOOD JOINT VENTURE	CHESTER	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000723-71- A-N	BLACK HAWK MINING INC	T12 R8 WELS	FILE HAS BEEN PUT IN INACTIVE LIC FILES
A-000080-71- C-R	BLUE ROCK INDUSTRIES	LEEDS	LIC HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000371-70- A-I	BORALEX ATHENS ENERGY INC	ATHENS	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91; TRACEY RICHARDS WAS PRIOR PROJ MGR
A-000689-71- A-N	BP OIL CO	SOUTH PORTLAND	FILE HAS BEEN PUT IN INACTIVE FILE; PRIOR PROJ MGR-STEPHANIE TOOTHAKER
A-000762-71- A-N	BREDERO PRICE CO	PITTSFIELD	LIC IN INACTIVE FILE 6/8/99; ALSO LOOK UNDER NAME COMPRESSION COAT INC; S 500 IN ADDRESS MEANS SUITE 500
A-000305-71- E-R	C B CUMMINGS & SONS CO	NORWAY	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000384-71- G-R	CARLETON WOOLEN MILLS INC	WINTHROP	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000386-74- A-R	CASCADE WOOLEN MILL INC	OAKLAND	(LIC PUT IN INACTIVE FILE - BLDG SOLD & HAS BEEN CLOSED SINCE AUG 1997 - NO BOILERS IN OPERATION; ANN FEE $252 PD 10/5/92; ANN FEE $252 PD 9/2/93
A-000725-71- A-N	CASELLA TIRES INC	ELIOT	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000164-70- A-I	CHAMPION INTL CORP INC	PASSADUMKEAG	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000609-74- A-N	COMMERCIAL RECYCLING SYSTEMS	SCARBOROUGH	FILE HAS BEEN PUT IN INACTIVE FILE; NEW SOURCE ANNUAL FEE $100.00 REC'D 6/2/93
A-000611-74- A-N	COMMERCIAL RECYCLING SYSTEMS	SCARBOROUGH	FILE HAS BEEN PUT IN INACTIVE FILE; NEW SOURCE ANNUAL FEE $100 REC'D 6/2/93
A-000823-71- A-N	COMMTEL INTERNET	PORTLAND	AIR EMISSION LICENSE FILE HAS BEEN PUT IN THE INACTIVE FILE; MS WALLINGFORD'S TITLE IS: FACILITIES MGR

DEP License#	COMPANY_NAME	LOCATION	COMMENTS
A-000713-71- A-N	CORNWALL INDUSTRIES INC	OXFORD	FILE HAS BEEN PUT IN INACTIVE FILE; CO NAME WAS CHANGED TO CORNWALL WOOD PRODUCTS, INC.
A-000259-74- C-R	CUMMINGS CONCRETE INC	ALTON	FILE HAS BEEN PUT IN INACTIVE FILE
A-000752-71- A-N	CUSTOM CRUSHING CO	PORTLAND	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000781-71- A-N	DANA WARP MILL LLC	WESTBROOK	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE; ? INFORMATION ON APPLICATION NOT CLEAR; NO FEE WAS REC'D W/APPLICATION
A-000648-74- A-N	DEFENSE FINANCE & ACCOUNTING SERVICE	LIMESTONE	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000549-74- B-R	DOWN EAST COMMUNITY HOSP	MACHIAS	5/16/2000 LIC PUT IN INACTIVE FILE; CHRISTOPHER LOUGHLIN/DEALS WITH ENVIRONMENTAL MATTERS-UPDATED INFORMATION REC'D 9/19/94
A-000293-71- E-R	DRAGON PRODUCTS CO INC	BUCKSPORT	(LIC HAS BEEN PUT IN INACTIVE FILE) NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000100-71- G-R	DRAGON PRODUCTS CO INC	EDGECOMB	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; DAVID GRINNELL/VP CONCRETE DIV (207) 774-6355; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000523-74- A-N	DRAGON PRODUCTS CO INC	HANCOCK	NOV. ANNUAL FEE FOR $100.00 REC'D 11/14/91; INACTIVE LIC-COMB. IN W/LIC A-299
A-000292-71- E-R	DRAGON PRODUCTS CO INC	LISBON	LIC FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT DAVID GRINNELL/VP CONCRETE DIV (207) 774-6355; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000514-71- E-R	DRAGON PRODUCTS CO INC	NAPLES	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000480-71- E-R	DRAGON PRODUCTS CO INC	WEST PARIS	LIC FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000547-74- A-N	DRAGON PRODUCTS CO, INC	WISCASSET	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; ANNUAL FEE OF $100.00 REC'D 1/16/92
A-000722-71- A-N	EARTH WASTE SYSTEMS OF ME INC	SACO	FILE IS IN INACTIVE LIC FILE; NOTE: CEASE THE OPERATION OF SHREDDING AS OF DEC. 31, 1999
A-000770-71- A-N	EBB TIDE PROPERTIES INC	AUGUSTA	LICENSE HAS BEEN PUT IN INACTIVE FILE
A-000479-71- D-M	F R CARROLL INC	CORNISH	(LIC HAS BEEN PUT IN INACTIVE LIC FILE) NO FEE PD OR REQUIRED
A-000056-71- E-T	FALCON SHOE/KNAPP DIV	LEWISTON	LIC HAS BEEN PUT IN INACTIVE FILE; NO TRANSFER FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000056-74- C-R	FALCON SHOE/KNAPP DIV	LEWISTON	LIC HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000382-71- D-R	FAYSCOTT CO	DEXTER	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000382-71- E-T	FAYSCOTT LLC	DEXTER	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO TRANSFER FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000681-71- C-N	FIBER EXTRUSION INC	EASTPORT	FILE HAS BEEN PUT IN INACTIVE FILE; FURTHER PROJ DESCRIPTION: ASSOCIATED WITH POLYESTER STAPLE FIBER MFG FACILITY; OTHER CONTACT: DAVID MACMAHON/PRESIDENT
A-000717-71- A-N	FIBERGLASS PLUS RECREATIONAL INDUSTRIES INC	KENNEBUNK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000457-71- C-N	FLC REALTY I CORP	SOUTH PORTLAND	LICENSE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91; KIM HIBBARD HAS ALSO BEEN PROJ MGR ON THIS LICENSE

DEP License#	COMPANY_NAME	LOCATION	COMMENTS
A-000194-71- F-R	FOREST AVENUE VETERINARY HOSP	PORTLAND	LIC FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000343-71- G-R	FORSTER MFG CO INC	WILTON	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000269-74- B-R	FRANKLIN SHOE CO DIV OF SHAER SHOE CO	FARMINGTON	(LIC HAS BEEN PUT IN INACTIVE FILE) JERRY WHITNEY IS PLANT MGR (UPDATED 11/6/95); PRIOR ACCEPTANCE DATE 8/17/90 UPDATED APPLIC SO NOW ACCEPTED 6/5/95
A-000477-70- A-I	GARDINER PAPERBOARD CORP	GARDINER	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000791-71- A-N	GDT CONST INC	ST AGATHA	FILE HAS BEEN PUT IN INACTIVE FILE
A-000220-71- E-R	GENEST CONCRETE WORKS INC	BERWICK	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000735-71- A-N	GORHAM ENERGY LTD PTNSP	GORHAM	FILE HAS BEEN PUT IN INACTIVE LIC FILE
A-000696-71- A-N	GORHAM SAND & GRAVEL INC	BUXTON	FILE HAS BEEN PUT IN INACTIVE FILE
A-000662-74- A-N	GRANITE STATE GAS TRANSMISSION INC	WELLS	FACILITY NEVER BUILT-FILE HAS BEEN PUT IN INACTIVE LICENSE FILE
A-000320-71- E-R	H G WINTER & SONS INC	KINGFIELD	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000411-73- C-R	H P HOOD, INC	NEWPORT	(LIC HAS BEEN PUT IN INACTIVE FILE)
A-000545-71- E-A	HAGUE INTL	KENNEBUNK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO AMENDMENT FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000545-71- F-R	HAGUE INTL	KENNEBUNK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000227-71- F-R	HOULTON INTERNATIONAL CORP	HOULTON	LIC FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000458-74- D-R	INDUSTRIAL METAL RECYCLING INC	OAKLAND	LIC HAS BEEN PUT IN INACTIVE FILE
A-000164-71- H-T	INTL PAPER CO	PASSADUMKEAG	FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: DAVID MADDOCKS/MILL MGR; NO TRANSFER FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000081-72- B-R	INTL WOOLEN CO, INC	SANFORD	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE
A-000031-74- C-R	J B BROWN & SONS	PORTLAND	FILE HAS BEEN PUT IN INACTIVE FILE
A-000469-71- C-R	JDHS ENTERPRISES	SCARBOROUGH	FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000440-74- B-R	JOHN J NISSEN BAKING CO	PORTLAND	LIC HAS BEEN PUT IN INACTIVE LIC FILE; ATS UPDATE TO TIM KIRK ON 2/3/94
A-000684-71- A-N	JSC CORP	BIDDEFORD	FILE HAS BEEN PUT IN INACTIVE LIC FILE
A-000414-71- D-R	KAGAN LOWN/DIV PENOBSCOT SHOE	OLD TOWN	LIC FILE HAS BEEN PUT IN INACTIVE FILE; MR KEANE'S TITLE IS EXEC VP FINANCE & ADMIN.; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000254-71- F-R	KENNEBEC VALLEY HUMANE SOCIETY	AUGUSTA	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000484-74- A-N	L & S SALES, INC	CARIBOU	FILE HAS BEEN PUT IN INACTIVE FILE; REC'D APPLI. W/$25.00 FEE (POSTED ABOVE) 4/28/86 4/28/86 APPLIC. UNACCEPT. 5/20/86/RET'D 5/20/86
A-000454-71- C-R	L RAY PACKING CO	MILBRIDGE	FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000337-74- C-R	L/A ELECTRIC MOTORS	LEWISTON	LIC HAS BEEN PUT IN INACTIVE LIC FILE
A-000337-74- D-T	L/A ELECTRIC MOTORS	LEWISTON	LIC HAS BEEN PUT IN INACTIVE LIC FILE

DEP License#	COMPANY_NAME	LOCATION	COMMENTS
A-000310-74- A-R	LAKELAND SAND & GRAVEL CO	RAYMOND	(LIC HAS BEEN PUT IN INACTIVE FILE)
A-000706-71- A-N	LAND STONE & MATERIALS	PLYMOUTH	FILE HAS BEEN PUT IN INACTIVE FILE
A-000531-74- A-N	LINCOLN SQUARE	PORTLAND	LIC HAS BEEN PUT IN INACTIVE LIC FILES
A-000539-71- E-R	LITTLE RIVER VETERINARY HOSP	NORTHPORT	FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: JANE MCLAUGHLIN; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000150-71- I-R	LUBEC PACKING CO	LUBEC	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000810-71- A-N	MAINE BIOLOGICAL LABORATORIES	AUGUSTA	AIR EMISSION LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000482-74- C-R	Maine DEPT OF TRANSPORTATION	AUGUSTA	STATE FACILITY EXEMPT FROM FEES; FILE HAS BEEN PUT IN INACTIVE FILE
A-000362-71- H-R	MAINE FROZEN FOODS INC	CARIBOU	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000433-71- B-N	MAINE STATE PRISON	THOMASTON	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; LIC EXP BEFORE RENEWAL APPLIC REC'D THEREFORE WILL BE PROCESSED AS NEW LIC; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000082-71- I-R	MAINE YANKEE	WISCASSET	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: STEPHEN EVANS/MGR EHS/EP @ 207 882-4546; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000784-71- A-N	MANAFORT BROTHERS INC	WISCASSET	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; ANOTHER TEL # FOR MR GERARDI IS (860) 793-6425
A-000856-71- A-N	MARITIMES & NORTHEAST PIPELINE LLC-GORHAM	GORHAM	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000298-74- C-R	MARRINERS INC	WARREN	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE
A-000685-71- C-R	MILLROCK INC	SANFORD	LIC FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000712-88- A-N	MONHEGAN ISLAND PLT	MONHEGAN ISLAND	(LIC PUT IN INACTIVE FILE)
A-000712-88- B-M	MONHEGAN ISLAND PLT	MONHEGAN ISLAND	(LIC PUT IN INACTIVE FILE) NO MINOR REVISION FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000775-71- A-N	MOOSE CROSSING LUMBER INC	ASHLAND	LICENSE FILE HAS BEEN PUT IN INACTIVE LICENSE FILE
A-000205-71- C-R	MOUNT DESERT ISLAND HOSP	BAR HARBOR	LIC HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000519-74- D-R	NATIONAL ALUM CORP	MADAWASKA	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE REC'D OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000118-71- D-R	NEW FRANKLIN TEXTILE SERVICES INC	BANGOR	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE REQUIRED FOR THIS APPLICATION; REC'D $250.00 3/20/96 TO BE APPLIED TO PAST DUE ANNUAL FEE
A-000767-71- A-N	NORTHERN BAY PEAT LLC	PENOBSCOT	(APPLICATION WAS NOT PHYSICALLY RETURNED TO APPLICANT BUT WAS PUT IN THE INACTIVE LIC FILE); THEIR CHECK FOR $257.00 BOUNCED-NO REFUND NECESSARY
A-000655-74- A-N	NRG BARRIERS INC	SACO	LIC HAS BEEN PUT IN INACTIVE LIC FILE
A-000788-71- A-N	OLD TOWN LUMBER CO	OLD TOWN	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; MR COMMLEAU'S EXT IS 116; NO FEE WAS REC'D W/APPLICATION
A-000335-71- D-R	PINE TREE VETERINARY HOSP	AUGUSTA	FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91

DEP License#	COMPANY_NAME	LOCATION	COMMENTS
A-000028-72- B-R	PINELAND CTR	NEW GLOUCESTER	FILE HAS BEEN PUT IN INACTIVE FILE; EXEMPT FROM FEES 1/15/86
A-000028-72- C-R	PINELAND CTR	NEW GLOUCESTER	LIC HAS BEEN PUT IN INACTIVE FILE; EXEMPT FROM FEES 5/3/89. MR BURGESS' EXT. 509
A-000526-71- E-R	R J GRONDIN & SONS INC	GORHAM	AIR EMISSION LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000742-71- A-N	RMC	PORTLAND	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE
A-000628-74- B-R	RRAS AUTO PARTS INC	VASSALBORO	LIC PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000025-74- D-R	SANFORD HOUSING AUTHORITY	SANFORD	LIC FILE HAS BEEN PUT IN INACTIVE FILE
A-000774-71- A-N	SANFORD PRECAST	SANFORD	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: PAUL PEDINI, VP
A-000651-71- C-R	SEBAGO INC	BRIDGTON	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000652-71- C-R	SEBAGO INC	WESTBROOK	FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000652-71- D-M	SEBAGO INC	WESTBROOK	FILE HAS BEEN PUT IN INACTIVE FILE; NO MINOR REVISION FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000653-71- D-R	SEBAGO INC	WESTBROOK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000253-71- E-N	SHERMAN LUMBER CO	SHERMAN STATION	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000096-74- F-R	SOUTHERN CONTAINER CORP	WESTBROOK	FILE HAS BEEN PUT IN INACTIVE FILE; MR LYMAN'S EXT IS 231; OR CURT LAYTON, MAINTENANCE SUPERVISOR AT EXT 286
A-000699-71- A-N	SPCA OF HANCOCK COUNTY, ME	SOUTHWEST HARBOR	FILE HAS BEEN PUT IN INACTIVE LICENSE FILE
A-000726-70- A-I	SPINNAKER COATING-MAINE INC	WESTBROOK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000471-71- D-R	STINSON SEAFOOD CO	BELFAST	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000869-71- A-N	THE LANE CONST CORP	CALAIS	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; MR PIERCE'S TITLE IS: ASSISTANT MECHANICAL SUPERVISOR; OTHER CONTACT: G K DRAKE/PLT MGR
A-000630-71- F-R	THOMAS DICENZO INC	BEDDINGTON	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: WILLIAM DELMONAOC, JR/PRESIDENT @ (207) 454-7538; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000670-71- A-N	TUKEY BROS INC	BELGRADE	FILE HAS BEEN PUT IN INACTIVE FILE
A-000693-71- A-N	TUPPER CONST CO	DURHAM	LICENSE FILE HAS BEEN PUT IN THE INACTIVE FILE
A-000437-74- A-N	VALLEY RECYCLING	CLINTON	LIC HAS BEEN PUT IN INACTIVE LIC FILE
A-000293-71- F-T	VAUGHN THIBODEAU & SONS INC	BUCKSPORT	(LIC HAS BEEN PUT IN INACTIVE FILE)
A-000157-71- F-R	WATERFRONT MAINE	BRUNSWICK	LICENSE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000675-71- A-N	WILLIAM A RENAUD JR TRUCKING INC	SOUTH BERWICK	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE

DEP License#	COMPANY_NAME	LOCATION	COMMENTS
A-000344-71- E-R	WILLIAM S WILLIAMS CONST CO INC	BELGRADE	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000466-73- A-R	WILNER WOOD PRODUCTS	NORWAY	FILE HAS BEEN PUT IN INACTIVE FILE; NO FEE TO BE CHARGED PER BRYCE SPROUL
A-000466-74- B-N	WILNER WOOD PRODUCTS CO, INC	PARIS	FILE HAS BEEN PUT IN INACTIVE FILE
A-000476-71- E-R	WILTON TANNING CO	EAST WILTON	LIC FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: RICHARD LAROCHELLE/PRESIDENT; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91
A-000562-71- E-R	ZF LEMFORDER CORP	BREWER	LICENSE FILE HAS BEEN PUT IN INACTIVE FILE; OTHER CONTACT: KEVIN KENNY/PLT MGR; NO RENEWAL FEE PD OR REQUIRED DUE TO ANNUAL FEE SYSTEM EFF 11/1/91

Appendix F: HAP Emission Factors for Indoor Residential Wood-Fired Heating Equipment

From TM #6 - APPENDIX A. INDOOR EQUIPMENT TAP EMISSION FACTORS

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
Benzene	Intercept (SFH,URBAN, All HDD Zones)	0.052	-0.305	0.409	0.281	209
	Other, RNF/S/U, All HDD Zones	0.055	-0.412	0.418	0.501	595
	Other, RF, All HDD Zones	0.170	-0.404	0.639	0.918	185
	Single, S, Low HDD Zone	0.396	-0.348	1.035	1.209	76
	Single, RNF, Low HDD Zone	0.621	-0.028	1.164	1.658	117
	Single, RF, Low HDD Zone	1.174	0.569	1.674	2.461	150
	Single, S, Med HDD Zone	1.099	0.326	1.768	3.366	68
	Single, RNF, Med HDD Zone	0.712	0.014	1.306	1.890	92
	Single, RF, Med HDD Zone	1.704	0.990	2.313	4.351	86
	Single, S, High HDD Zone	1.008	0.205	1.707	3.196	61
	Single, RNF, High HDD Zone	2.027	1.316	2.633	4.894	87
	Single, RF, High HDD Zone	2.547	1.958	3.031	6.034	166
		0.688	.	.	2.748	1892
Cadmium	Intercept (SFH,URBAN, All HDD Zones)	1.49E-06	-8.72E-06	1.17E-05	6.92E-06	209
	Other, RNF/S/U, All HDD Zones	1.60E-06	-1.18E-05	1.20E-05	1.37E-05	595
	Other, RF, All HDD Zones	4.86E-06	-1.15E-05	1.83E-05	2.53E-05	185
	Single, S, Low HDD Zone	1.27E-05	-8.57E-06	3.10E-05	3.99E-05	76
	Single, RNF, Low HDD Zone	1.73E-05	-1.25E-06	3.28E-05	4.44E-05	117
	Single, RF, Low HDD Zone	3.57E-05	1.85E-05	5.00E-05	7.65E-05	150
	Single, S, Med HDD Zone	3.17E-05	9.56E-06	5.08E-05	9.37E-05	68
	Single, RNF, Med HDD Zone	2.05E-05	5.44E-07	3.75E-05	5.59E-05	92
	Single, RF, Med HDD Zone	4.82E-05	2.78E-05	6.56E-05	1.30E-04	86
	Single, S, High HDD Zone	2.45E-05	1.58E-06	4.45E-05	7.38E-05	61
	Single, RNF, High HDD Zone	5.92E-05	3.89E-05	7.65E-05	1.35E-04	87
	Single, RF, High HDD Zone	7.31E-05	5.63E-05	8.70E-05	1.74E-04	166
		1.98E-05	.	.	7.86E-05	1892
Manganese	Intercept (SFH,URBAN, All HDD Zones)	1.05E-05	-6.34E-05	8.45E-05	4.59E-05	209
	Other, RNF/S/U, All HDD Zones	1.15E-05	-8.50E-05	8.69E-05	9.73E-05	595
	Other, RF, All HDD Zones	3.46E-05	-8.38E-05	1.32E-04	1.81E-04	185
	Single, S, Low HDD Zone	9.62E-05	-5.75E-05	2.29E-04	3.07E-04	76

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RNF, Low HDD Zone	1.21E-04	-1.32E-05	2.34E-04	3.13E-04	117
	Single, RF, Low HDD Zone	2.63E-04	1.39E-04	3.67E-04	5.77E-04	150
	Single, S, Med HDD Zone	2.26E-04	6.62E-05	3.65E-04	6.65E-04	68
	Single, RNF, Med HDD Zone	1.46E-04	1.99E-06	2.69E-04	4.14E-04	92
	Single, RF, Med HDD Zone	3.40E-04	1.93E-04	4.67E-04	9.62E-04	86
	Single, S, High HDD Zone	1.56E-04	-1.04E-05	3.01E-04	4.57E-04	61
	Single, RNF, High HDD Zone	4.26E-04	2.79E-04	5.52E-04	9.58E-04	87
	Single, RF, High HDD Zone	5.21E-04	3.99E-04	6.21E-04	1.26E-03	166
		1.41E-04	.	.	5.69E-04	1892
Methyl Ethyl Ketone	Intercept (SFH,URBAN, All HDD Zones)	0.015	-0.101	0.131	0.063	209
	Other, RNF/S/U, All HDD Zones	0.017	-0.133	0.136	0.151	595
	Other, RF, All HDD Zones	0.049	-0.135	0.203	0.282	185
	Single, S, Low HDD Zone	0.158	-0.081	0.367	0.522	76
	Single, RNF, Low HDD Zone	0.164	-0.044	0.342	0.482	117
	Single, RF, Low HDD Zone	0.408	0.214	0.572	0.967	150
	Single, S, Med HDD Zone	0.324	0.075	0.543	0.989	68
	Single, RNF, Med HDD Zone	0.209	-0.015	0.404	0.682	92
	Single, RF, Med HDD Zone	0.474	0.245	0.674	1.573	86
	Single, S, High HDD Zone	0.153	-0.105	0.382	0.502	61
	Single, RNF, High HDD Zone	0.623	0.395	0.822	1.417	87
	Single, RF, High HDD Zone	0.743	0.554	0.902	1.981	166
		0.203	.	.	0.885	1892
Nickel	Intercept (SFH,URBAN, All HDD Zones)	8.18E-07	-5.07E-06	6.70E-06	3.46E-06	209
	Other, RNF/S/U, All HDD Zones	8.98E-07	-6.76E-06	6.92E-06	7.68E-06	595
	Other, RF, All HDD Zones	2.69E-06	-6.71E-06	1.05E-05	1.43E-05	185
	Single, S, Low HDD Zone	7.83E-06	-4.38E-06	1.84E-05	2.52E-05	76
	Single, RNF, Low HDD Zone	9.29E-06	-1.35E-06	1.83E-05	2.46E-05	117
	Single, RF, Low HDD Zone	2.11E-05	1.11E-05	2.93E-05	4.71E-05	150
	Single, S, Med HDD Zone	1.77E-05	4.96E-06	2.87E-05	5.21E-05	68
	Single, RNF, Med HDD Zone	1.14E-05	-3.53E-08	2.12E-05	3.35E-05	92
	Single, RF, Med HDD Zone	2.64E-05	1.47E-05	3.65E-05	7.77E-05	86
	Single, S, High HDD Zone	1.11E-05	-2.11E-06	2.26E-05	3.25E-05	61
	Single, RNF, High HDD Zone	3.35E-05	2.18E-05	4.35E-05	7.49E-05	87
	Single, RF, High HDD Zone	4.06E-05	3.10E-05	4.87E-05	1.01E-04	166
		1.10E-05	.	.	4.52E-05	1892

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
Phenol	Intercept (SFH,URBAN, All HDD Zones)	0.034	-0.219	0.287	0.141	209
	Other, RNF/S/U, All HDD Zones	0.037	-0.290	0.298	0.329	595
	Other, RF, All HDD Zones	0.112	-0.291	0.447	0.614	185
	Single, S, Low HDD Zone	0.343	-0.181	0.799	1.120	76
	Single, RNF, Low HDD Zone	0.378	-0.078	0.766	1.049	117
	Single, RF, Low HDD Zone	0.901	0.476	1.258	2.077	150
	Single, S, Med HDD Zone	0.733	0.189	1.210	2.194	68
	Single, RNF, Med HDD Zone	0.474	-0.017	0.898	1.467	92
	Single, RF, Med HDD Zone	1.084	0.582	1.518	3.397	86
	Single, S, High HDD Zone	0.400	-0.166	0.898	1.206	61
	Single, RNF, High HDD Zone	1.401	0.901	1.834	3.150	87
	Single, RF, High HDD Zone	1.684	1.271	2.031	4.327	166
		0.459	.	.	1.937	1892
Toluene	Intercept (SFH,URBAN, All HDD Zones)	0.042	-0.262	0.346	0.177	209
	Other, RNF/S/U, All HDD Zones	0.046	-0.349	0.358	0.397	595
	Other, RF, All HDD Zones	0.138	-0.348	0.540	0.739	185
	Single, S, Low HDD Zone	0.407	-0.224	0.954	1.316	76
	Single, RNF, Low HDD Zone	0.475	-0.075	0.941	1.267	117
	Single, RF, Low HDD Zone	1.089	0.576	1.517	2.450	150
	Single, S, Med HDD Zone	0.907	0.251	1.479	2.682	68
	Single, RNF, Med HDD Zone	0.587	-0.005	1.095	1.738	92
	Single, RF, Med HDD Zone	1.352	0.747	1.874	4.035	86
	Single, S, High HDD Zone	0.554	-0.128	1.152	1.625	61
	Single, RNF, High HDD Zone	1.723	1.119	2.242	3.857	87
	Single, RF, High HDD Zone	2.087	1.588	2.502	5.203	166
		0.567	.	.	2.335	1892
o-Xylene	Intercept (SFH,URBAN, All HDD Zones)	0.012	-0.074	0.098	0.052	209
	Other, RNF/S/U, All HDD Zones	0.013	-0.099	0.101	0.112	595
	Other, RF, All HDD Zones	0.040	-0.097	0.153	0.209	185
	Single, S, Low HDD Zone	0.113	-0.066	0.267	0.361	76
	Single, RNF, Low HDD Zone	0.138	-0.017	0.269	0.360	117
	Single, RF, Low HDD Zone	0.306	0.162	0.427	0.676	150
	Single, S, Med HDD Zone	0.260	0.075	0.421	0.766	68
	Single, RNF, Med HDD Zone	0.169	0.001	0.312	0.483	92

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Med HDD Zone	0.391	0.220	0.538	1.123	86
	Single, S, High HDD Zone	0.173	-0.019	0.342	0.508	61
	Single, RNF, High HDD Zone	0.492	0.322	0.638	1.104	87
	Single, RF, High HDD Zone	0.600	0.459	0.717	1.465	166
		0.163	.	.	0.659	1892
Total PAH	Intercept (SFH,URBAN, All HDD Zones)	0.041	-0.238	0.320	0.172	209
	Other, RNF/S/U, All HDD Zones	0.045	-0.320	0.328	0.393	595
	Other, RF, All HDD Zones	0.136	-0.312	0.501	0.732	185
	Single, S, Low HDD Zone	0.405	-0.176	0.904	1.315	76
	Single, RNF, Low HDD Zone	0.465	-0.042	0.889	1.253	117
	Single, RF, Low HDD Zone	1.062	0.589	1.452	2.417	150
	Single, S, Med HDD Zone	0.891	0.288	1.413	2.644	68
	Single, RNF, Med HDD Zone	0.577	0.032	1.040	1.731	92
	Single, RF, Med HDD Zone	1.267	0.710	1.743	3.590	86
	Single, S, High HDD Zone	0.509	-0.118	1.055	1.506	61
	Single, RNF, High HDD Zone	1.676	1.121	2.149	3.764	87
	Single, RF, High HDD Zone	1.900	1.440	2.278	4.516	166
		0.539	.	.	2.142	1892
16-PAH	Intercept (SFH,URBAN, All HDD Zones)	0.041	-0.259	0.340	0.170	209
	Other, RNF/S/U, All HDD Zones	0.045	-0.344	0.353	0.390	595
	Other, RF, All HDD Zones	0.134	-0.344	0.531	0.727	185
	Single, S, Low HDD Zone	0.404	-0.217	0.944	1.315	76
	Single, RNF, Low HDD Zone	0.457	-0.084	0.917	1.244	117
	Single, RF, Low HDD Zone	1.070	0.566	1.493	2.442	150
	Single, S, Med HDD Zone	0.880	0.235	1.444	2.618	68
	Single, RNF, Med HDD Zone	0.569	-0.013	1.071	1.727	92
	Single, RF, Med HDD Zone	1.306	0.710	1.820	4.005	86
	Single, S, High HDD Zone	0.505	-0.166	1.095	1.498	61
	Single, RNF, High HDD Zone	1.677	1.084	2.190	3.761	87
	Single, RF, High HDD Zone	2.023	1.532	2.433	5.127	166
		0.551	.	.	2.298	1892
Acenaphthene	Intercept (SFH,URBAN, All HDD Zones)	0.001	-0.004	0.005	0.002	209
	Other, RNF/S/U, All HDD Zones	0.001	-0.005	0.005	0.005	595
	Other, RF, All HDD Zones	0.002	-0.005	0.007	0.010	185
	Single, S, Low HDD Zone	0.006	-0.003	0.013	0.018	76

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RNF, Low HDD Zone	0.007	-0.001	0.013	0.018	117
	Single, RF, Low HDD Zone	0.015	0.008	0.021	0.034	150
	Single, S, Med HDD Zone	0.013	0.004	0.021	0.037	68
	Single, RNF, Med HDD Zone	0.008	0.000	0.015	0.024	92
	Single, RF, Med HDD Zone	0.019	0.011	0.026	0.056	86
	Single, S, High HDD Zone	0.008	-0.001	0.016	0.023	61
	Single, RNF, High HDD Zone	0.024	0.016	0.031	0.054	87
	Single, RF, High HDD Zone	0.029	0.022	0.035	0.072	166
		0.008	.	.	0.032	1892
Acenaphthylene	Intercept (SFH,URBAN, All HDD Zones)	0.011	-0.074	0.096	0.046	209
	Other, RNF/S/U, All HDD Zones	0.012	-0.097	0.100	0.111	595
	Other, RF, All HDD Zones	0.036	-0.098	0.149	0.207	185
	Single, S, Low HDD Zone	0.116	-0.059	0.269	0.382	76
	Single, RNF, Low HDD Zone	0.121	-0.032	0.251	0.353	117
	Single, RF, Low HDD Zone	0.299	0.157	0.419	0.707	150
	Single, S, Med HDD Zone	0.238	0.056	0.398	0.725	68
	Single, RNF, Med HDD Zone	0.154	-0.010	0.297	0.498	92
	Single, RF, Med HDD Zone	0.349	0.181	0.495	1.151	86
	Single, S, High HDD Zone	0.115	-0.074	0.282	0.371	61
	Single, RNF, High HDD Zone	0.458	0.291	0.603	1.040	87
	Single, RF, High HDD Zone	0.547	0.408	0.663	1.451	166
		0.149	.	.	0.648	1892
Anthracene	Intercept (SFH,URBAN, All HDD Zones)	0.001	-0.005	0.007	0.003	209
	Other, RNF/S/U, All HDD Zones	0.001	-0.007	0.007	0.008	595
	Other, RF, All HDD Zones	0.003	-0.007	0.010	0.014	185
	Single, S, Low HDD Zone	0.008	-0.004	0.018	0.025	76
	Single, RNF, Low HDD Zone	0.009	-0.002	0.018	0.024	117
	Single, RF, Low HDD Zone	0.021	0.011	0.029	0.047	150
	Single, S, Med HDD Zone	0.017	0.005	0.028	0.051	68
	Single, RNF, Med HDD Zone	0.011	0.000	0.021	0.033	92
	Single, RF, Med HDD Zone	0.026	0.014	0.035	0.077	86
	Single, S, High HDD Zone	0.010	-0.003	0.022	0.030	61
	Single, RNF, High HDD Zone	0.033	0.021	0.043	0.073	87
	Single, RF, High HDD Zone	0.039	0.030	0.047	0.099	166

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
		0.011	.	.	0.044	1892
Benzo(a)anthracene	Intercept (SFH,URBAN, All HDD Zones)	0.001	-0.007	0.009	0.005	209
	Other, RNF/S/U, All HDD Zones	0.001	-0.009	0.010	0.011	595
	Other, RF, All HDD Zones	0.004	-0.009	0.015	0.020	185
	Single, S, Low HDD Zone	0.011	-0.006	0.026	0.036	76
	Single, RNF, Low HDD Zone	0.013	-0.002	0.025	0.034	117
	Single, RF, Low HDD Zone	0.029	0.016	0.041	0.067	150
	Single, S, Med HDD Zone	0.024	0.007	0.040	0.072	68
	Single, RNF, Med HDD Zone	0.016	0.000	0.030	0.047	92
	Single, RF, Med HDD Zone	0.036	0.020	0.050	0.110	86
	Single, S, High HDD Zone	0.014	-0.004	0.030	0.042	61
	Single, RNF, High HDD Zone	0.046	0.030	0.060	0.104	87
	Single, RF, High HDD Zone	0.056	0.042	0.067	0.141	166
		0.015	.	.	0.063	1892
Benzo(b)fluoranthene	Intercept (SFH,URBAN, All HDD Zones)	0.000	-0.002	0.003	0.001	209
	Other, RNF/S/U, All HDD Zones	0.000	-0.003	0.003	0.003	595
	Other, RF, All HDD Zones	0.001	-0.003	0.004	0.006	185
	Single, S, Low HDD Zone	0.003	-0.002	0.008	0.011	76
	Single, RNF, Low HDD Zone	0.004	-0.001	0.008	0.010	117
	Single, RF, Low HDD Zone	0.009	0.005	0.012	0.020	150
	Single, S, Med HDD Zone	0.007	0.002	0.012	0.022	68
	Single, RNF, Med HDD Zone	0.005	0.000	0.009	0.014	92
	Single, RF, Med HDD Zone	0.011	0.006	0.015	0.033	86
	Single, S, High HDD Zone	0.004	-0.001	0.009	0.013	61
	Single, RNF, High HDD Zone	0.014	0.009	0.018	0.031	87
	Single, RF, High HDD Zone	0.017	0.013	0.020	0.043	166
		0.005	.	.	0.019	1892
Benzo(k)fluoranthene	Intercept (SFH,URBAN, All HDD Zones)	1.09E-04	-7.07E-04	9.26E-04	4.58E-04	209
	Other, RNF/S/U, All HDD Zones	1.21E-04	-9.37E-04	9.61E-04	1.06E-03	595
	Other, RF, All HDD Zones	3.62E-04	-9.38E-04	1.44E-03	1.98E-03	185
	Single, S, Low HDD Zone	1.10E-03	-5.86E-04	2.57E-03	3.60E-03	76
	Single, RNF, Low HDD Zone	1.23E-03	-2.42E-04	2.48E-03	3.39E-03	117
	Single, RF, Low HDD Zone	2.91E-03	1.54E-03	4.06E-03	6.68E-03	150
	Single, S, Med HDD Zone	2.38E-03	6.23E-04	3.92E-03	7.10E-03	68
	Single, RNF, Med HDD Zone	1.54E-03	-4.62E-05	2.91E-03	4.72E-03	92

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Med HDD Zone	3.52E-03	1.90E-03	4.92E-03	1.09E-02	86
	Single, S, High HDD Zone	1.32E-03	-5.02E-04	2.93E-03	3.97E-03	61
	Single, RNF, High HDD Zone	4.54E-03	2.93E-03	5.94E-03	1.02E-02	87
	Single, RF, High HDD Zone	5.47E-03	4.13E-03	6.58E-03	1.40E-02	166
		1.49E-03	.	.	6.25E-03	1892
Benzo(ghi)perylene	Intercept (SFH,URBAN, All HDD Zones)	3.35E-04	-1.96E-03	2.63E-03	1.89E-03	209
	Other, RNF/S/U, All HDD Zones	3.52E-04	-2.65E-03	2.69E-03	3.27E-03	595
	Other, RF, All HDD Zones	1.08E-03	-2.60E-03	4.10E-03	5.98E-03	185
	Single, S, Low HDD Zone	2.43E-03	-2.35E-03	6.55E-03	7.37E-03	76
	Single, RNF, Low HDD Zone	3.99E-03	-1.76E-04	7.49E-03	1.09E-02	117
	Single, RF, Low HDD Zone	7.34E-03	3.46E-03	1.06E-02	1.54E-02	150
	Single, S, Med HDD Zone	7.00E-03	2.03E-03	1.13E-02	2.18E-02	68
	Single, RNF, Med HDD Zone	4.54E-03	4.72E-05	8.36E-03	1.21E-02	92
	Single, RF, Med HDD Zone	1.09E-02	6.32E-03	1.48E-02	2.76E-02	86
	Single, S, High HDD Zone	6.73E-03	1.56E-03	1.12E-02	2.17E-02	61
	Single, RNF, High HDD Zone	1.29E-02	8.28E-03	1.68E-02	3.17E-02	87
	Single, RF, High HDD Zone	1.62E-02	1.25E-02	1.94E-02	3.87E-02	166
		4.38E-03	.	.	1.77E-02	1892
Benzo(a)pyrene	Intercept (SFH,URBAN, All HDD Zones)	2.58E-04	-1.53E-03	2.04E-03	1.15E-03	209
	Other, RNF/S/U, All HDD Zones	2.79E-04	-2.06E-03	2.10E-03	2.37E-03	595
	Other, RF, All HDD Zones	8.44E-04	-2.02E-03	3.19E-03	4.39E-03	185
	Single, S, Low HDD Zone	2.28E-03	-1.44E-03	5.49E-03	7.23E-03	76
	Single, RNF, Low HDD Zone	2.97E-03	-2.69E-04	5.70E-03	7.64E-03	117
	Single, RF, Low HDD Zone	6.33E-03	3.31E-03	8.84E-03	1.37E-02	150
	Single, S, Med HDD Zone	5.51E-03	1.64E-03	8.86E-03	1.62E-02	68
	Single, RNF, Med HDD Zone	3.56E-03	7.50E-05	6.54E-03	9.90E-03	92
	Single, RF, Med HDD Zone	8.33E-03	4.77E-03	1.14E-02	2.30E-02	86
	Single, S, High HDD Zone	4.01E-03	-8.15E-06	7.51E-03	1.19E-02	61
	Single, RNF, High HDD Zone	1.03E-02	6.79E-03	1.34E-02	2.34E-02	87
	Single, RF, High HDD Zone	1.27E-02	9.76E-03	1.51E-02	3.05E-02	166
		3.45E-03	.	.	1.38E-02	1892
Chrysene	Intercept (SFH,URBAN, All HDD Zones)	7.08E-04	-4.36E-03	5.78E-03	3.01E-03	209
	Other, RNF/S/U, All HDD Zones	7.77E-04	-5.83E-03	5.96E-03	6.63E-03	595
	Other, RF, All HDD Zones	2.33E-03	-5.78E-03	9.02E-03	1.23E-02	185
	Single, S, Low HDD Zone	6.72E-03	-3.81E-03	1.58E-02	2.16E-02	76

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RNF, Low HDD Zone	8.06E-03	-1.11E-03	1.58E-02	2.12E-02	117
	Single, RF, Low HDD Zone	1.81E-02	9.59E-03	2.53E-02	4.04E-02	150
	Single, S, Med HDD Zone	1.53E-02	4.33E-03	2.48E-02	4.50E-02	68
	Single, RNF, Med HDD Zone	9.88E-03	3.95E-06	1.83E-02	2.88E-02	92
	Single, RF, Med HDD Zone	2.29E-02	1.28E-02	3.15E-02	6.68E-02	86
	Single, S, High HDD Zone	9.76E-03	-1.62E-03	1.97E-02	2.86E-02	61
	Single, RNF, High HDD Zone	2.89E-02	1.89E-02	3.76E-02	6.48E-02	87
	Single, RF, High HDD Zone	3.52E-02	2.68E-02	4.21E-02	8.67E-02	166
		9.56E-03	.	.	3.90E-02	1892
Diddenzo(ah)anthracene	Intercept (SFH,URBAN, All HDD Zones)	7.92E-04	-5.00E-03	6.58E-03	3.32E-03	209
	Other, RNF/S/U, All HDD Zones	8.74E-04	-6.65E-03	6.81E-03	7.55E-03	595
	Other, RF, All HDD Zones	2.61E-03	-6.63E-03	1.03E-02	1.41E-02	185
	Single, S, Low HDD Zone	7.78E-03	-4.23E-03	1.82E-02	2.52E-02	76
	Single, RNF, Low HDD Zone	8.95E-03	-1.51E-03	1.78E-02	2.41E-02	117
	Single, RF, Low HDD Zone	2.07E-02	1.10E-02	2.89E-02	4.69E-02	150
	Single, S, Med HDD Zone	1.72E-02	4.67E-03	2.81E-02	5.09E-02	68
	Single, RNF, Med HDD Zone	1.11E-02	-1.69E-04	2.08E-02	3.32E-02	92
	Single, RF, Med HDD Zone	2.55E-02	1.40E-02	3.54E-02	7.71E-02	86
	Single, S, High HDD Zone	1.02E-02	-2.80E-03	2.16E-02	3.00E-02	61
	Single, RNF, High HDD Zone	3.26E-02	2.12E-02	4.25E-02	7.31E-02	87
	Single, RF, High HDD Zone	3.95E-02	3.00E-02	4.74E-02	9.91E-02	166
		1.07E-02	.	.	4.44E-02	1892
Fluoranthene	Intercept (SFH,URBAN, All HDD Zones)	1.09E-03	-7.07E-03	9.26E-03	4.58E-03	209
	Other, RNF/S/U, All HDD Zones	1.21E-03	-9.37E-03	9.61E-03	1.06E-02	595
	Other, RF, All HDD Zones	3.62E-03	-9.38E-03	1.44E-02	1.98E-02	185
	Single, S, Low HDD Zone	1.10E-02	-5.86E-03	2.57E-02	3.60E-02	76
	Single, RNF, Low HDD Zone	1.23E-02	-2.42E-03	2.48E-02	3.39E-02	117
	Single, RF, Low HDD Zone	2.91E-02	1.54E-02	4.06E-02	6.68E-02	150
	Single, S, Med HDD Zone	2.38E-02	6.23E-03	3.92E-02	7.10E-02	68
	Single, RNF, Med HDD Zone	1.54E-02	-4.62E-04	2.91E-02	4.72E-02	92
	Single, RF, Med HDD Zone	3.52E-02	1.90E-02	4.92E-02	1.09E-01	86
	Single, S, High HDD Zone	1.32E-02	-5.02E-03	2.93E-02	3.97E-02	61
	Single, RNF, High HDD Zone	4.54E-02	2.93E-02	5.94E-02	1.02E-01	87
	Single, RF, High HDD Zone	5.47E-02	4.13E-02	6.58E-02	1.40E-01	166
		1.49E-02	.	.	6.25E-02	1892

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
Fluorene	Intercept (SFH,URBAN, All HDD Zones)	1.34E-03	-8.53E-03	1.12E-02	5.61E-03	209
	Other, RNF/S/U, All HDD Zones	1.48E-03	-1.13E-02	1.16E-02	1.28E-02	595
	Other, RF, All HDD Zones	4.42E-03	-1.13E-02	1.75E-02	2.40E-02	185
	Single, S, Low HDD Zone	1.33E-02	-7.16E-03	3.11E-02	4.32E-02	76
	Single, RNF, Low HDD Zone	1.51E-02	-2.72E-03	3.02E-02	4.10E-02	117
	Single, RF, Low HDD Zone	3.53E-02	1.87E-02	4.92E-02	8.03E-02	150
	Single, S, Med HDD Zone	2.90E-02	7.79E-03	4.76E-02	8.63E-02	68
	Single, RNF, Med HDD Zone	1.88E-02	-3.95E-04	3.53E-02	5.68E-02	92
	Single, RF, Med HDD Zone	4.31E-02	2.35E-02	6.01E-02	1.32E-01	86
	Single, S, High HDD Zone	1.68E-02	-5.31E-03	3.62E-02	4.98E-02	61
	Single, RNF, High HDD Zone	5.53E-02	3.58E-02	7.22E-02	1.24E-01	87
	Single, RF, High HDD Zone	6.68E-02	5.06E-02	8.03E-02	1.69E-01	166
		1.82E-02	.	.	7.57E-02	1892
Indeno(123cd)pyrene	Intercept (SFH,URBAN, All HDD Zones)	1.55E-04	-1.50E-03	1.81E-03	1.83E-03	209
	Other, RNF/S/U, All HDD Zones	1.46E-04	-1.93E-03	1.91E-03	2.77E-03	595
	Other, RF, All HDD Zones	4.80E-04	-2.09E-03	2.74E-03	5.03E-03	185
	Single, S, Low HDD Zone	2.99E-04	-3.06E-03	3.35E-03	1.66E-03	76
	Single, RNF, Low HDD Zone	2.05E-03	-8.69E-04	4.65E-03	9.73E-03	117
	Single, RF, Low HDD Zone	2.03E-03	-6.82E-04	4.43E-03	9.09E-03	150
	Single, S, Med HDD Zone	2.99E-03	-5.00E-04	6.17E-03	1.55E-02	68
	Single, RNF, Med HDD Zone	1.94E-03	-1.20E-03	4.78E-03	8.90E-03	92
	Single, RF, Med HDD Zone	5.16E-03	1.94E-03	8.07E-03	1.87E-02	86
	Single, S, High HDD Zone	5.44E-03	1.81E-03	8.76E-03	2.14E-02	61
	Single, RNF, High HDD Zone	5.03E-03	1.83E-03	7.93E-03	2.28E-02	87
	Single, RF, High HDD Zone	7.07E-03	4.43E-03	9.40E-03	2.70E-02	166
		1.87E-03	.	.	1.24E-02	1892
Naphthalene	Intercept (SFH,URBAN, All HDD Zones)	0.016	-0.102	0.134	0.067	209
	Other, RNF/S/U, All HDD Zones	0.018	-0.136	0.139	0.154	595
	Other, RF, All HDD Zones	0.053	-0.136	0.210	0.287	185
	Single, S, Low HDD Zone	0.159	-0.086	0.373	0.519	76
	Single, RNF, Low HDD Zone	0.181	-0.033	0.362	0.491	117
	Single, RF, Low HDD Zone	0.423	0.224	0.590	0.963	150
	Single, S, Med HDD Zone	0.348	0.093	0.571	1.034	68
	Single, RNF, Med HDD Zone	0.225	-0.005	0.423	0.682	92
	Single, RF, Med HDD Zone	0.516	0.281	0.719	1.581	86

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, S, High HDD Zone	0.200	-0.065	0.433	0.594	61
	Single, RNF, High HDD Zone	0.663	0.428	0.865	1.486	87
	Single, RF, High HDD Zone	0.800	0.606	0.962	2.024	166
		0.218	.	.	0.907	1892
Phenanthrene	Intercept (SFH,URBAN, All HDD Zones)	4.84E-03	-2.91E-02	3.88E-02	2.11E-02	209
	Other, RNF/S/U, All HDD Zones	5.27E-03	-3.90E-02	3.99E-02	4.47E-02	595
	Other, RF, All HDD Zones	1.59E-02	-3.85E-02	6.06E-02	8.29E-02	185
	Single, S, Low HDD Zone	4.41E-02	-2.64E-02	1.05E-01	1.41E-01	76
	Single, RNF, Low HDD Zone	5.55E-02	-6.03E-03	1.07E-01	1.44E-01	117
	Single, RF, Low HDD Zone	1.21E-01	6.36E-02	1.69E-01	2.65E-01	150
	Single, S, Med HDD Zone	1.04E-01	3.04E-02	1.67E-01	3.05E-01	68
	Single, RNF, Med HDD Zone	6.72E-02	9.30E-04	1.24E-01	1.90E-01	92
	Single, RF, Med HDD Zone	1.56E-01	8.86E-02	2.14E-01	4.42E-01	86
	Single, S, High HDD Zone	7.16E-02	-4.65E-03	1.38E-01	2.10E-01	61
	Single, RNF, High HDD Zone	1.96E-01	1.28E-01	2.53E-01	4.40E-01	87
	Single, RF, High HDD Zone	2.39E-01	1.83E-01	2.85E-01	5.79E-01	166
		6.49E-02	.	.	2.61E-01	1892
Pyrene	Intercept (SFH,URBAN, All HDD Zones)	1.27E-03	-8.42E-03	1.10E-02	5.36E-03	209
	Other, RNF/S/U, All HDD Zones	1.42E-03	-1.11E-02	1.14E-02	1.26E-02	595
	Other, RF, All HDD Zones	4.22E-03	-1.12E-02	1.71E-02	2.36E-02	185
	Single, S, Low HDD Zone	1.32E-02	-6.87E-03	3.07E-02	4.32E-02	76
	Single, RNF, Low HDD Zone	1.42E-02	-3.21E-03	2.92E-02	4.02E-02	117
	Single, RF, Low HDD Zone	3.44E-02	1.82E-02	4.81E-02	8.01E-02	150
	Single, S, Med HDD Zone	2.78E-02	6.97E-03	4.61E-02	8.37E-02	68
	Single, RNF, Med HDD Zone	1.80E-02	-8.19E-04	3.42E-02	5.65E-02	92
	Single, RF, Med HDD Zone	4.10E-02	2.17E-02	5.77E-02	1.31E-01	86
	Single, S, High HDD Zone	1.45E-02	-7.13E-03	3.36E-02	4.47E-02	61
	Single, RNF, High HDD Zone	5.32E-02	3.41E-02	6.98E-02	1.20E-01	87
	Single, RF, High HDD Zone	6.38E-02	4.80E-02	7.71E-02	1.66E-01	166
		1.74E-02	.	.	7.42E-02	1892
Biphenyl	Intercept (SFH,URBAN, All HDD Zones)	1.35E-03	-8.15E-03	1.08E-02	5.82E-03	209
	Other, RNF/S/U, All HDD Zones	1.47E-03	-1.09E-02	1.12E-02	1.25E-02	595
	Other, RF, All HDD Zones	4.42E-03	-1.08E-02	1.69E-02	2.31E-02	185
	Single, S, Low HDD Zone	1.24E-02	-7.31E-03	2.95E-02	3.97E-02	76
	Single, RNF, Low HDD Zone	1.54E-02	-1.79E-03	2.99E-02	4.00E-02	117

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Low HDD Zone	3.39E-02	1.78E-02	4.72E-02	7.45E-02	150
	Single, S, Med HDD Zone	2.89E-02	8.41E-03	4.67E-02	8.51E-02	68
	Single, RNF, Med HDD Zone	1.87E-02	1.99E-04	3.45E-02	5.33E-02	92
	Single, RF, Med HDD Zone	4.35E-02	2.45E-02	5.97E-02	1.24E-01	86
	Single, S, High HDD Zone	1.96E-02	-1.76E-03	3.82E-02	5.74E-02	61
	Single, RNF, High HDD Zone	5.46E-02	3.57E-02	7.07E-02	1.23E-01	87
	Single, RF, High HDD Zone	6.66E-02	5.10E-02	7.95E-02	1.62E-01	166
		1.81E-02	.	.	7.30E-02	1892
n-Hexane	Intercept (SFH,URBAN, All HDD Zones)	8.93E-04	-5.20E-03	6.99E-03	4.88E-03	209
	Other, RNF/S/U, All HDD Zones	9.40E-04	-7.04E-03	7.13E-03	8.60E-03	595
	Other, RF, All HDD Zones	2.89E-03	-6.90E-03	1.09E-02	1.58E-02	185
	Single, S, Low HDD Zone	6.63E-03	-6.06E-03	1.75E-02	2.02E-02	76
	Single, RNF, Low HDD Zone	1.06E-02	-4.67E-04	1.99E-02	2.86E-02	117
	Single, RF, Low HDD Zone	1.98E-02	9.49E-03	2.84E-02	4.15E-02	150
	Single, S, Med HDD Zone	1.87E-02	5.50E-03	3.01E-02	5.76E-02	68
	Single, RNF, Med HDD Zone	1.21E-02	1.96E-04	2.22E-02	3.21E-02	92
	Single, RF, Med HDD Zone	2.90E-02	1.69E-02	3.94E-02	7.39E-02	86
	Single, S, High HDD Zone	1.75E-02	3.77E-03	2.94E-02	5.58E-02	61
	Single, RNF, High HDD Zone	3.44E-02	2.23E-02	4.48E-02	8.38E-02	87
	Single, RF, High HDD Zone	4.33E-02	3.33E-02	5.16E-02	1.03E-01	166
		1.17E-02	.	.	4.69E-02	1892
1,3-Butadiene	Intercept (SFH,URBAN, All HDD Zones)	0.011	-0.061	0.082	0.056	209
	Other, RNF/S/U, All HDD Zones	0.011	-0.083	0.084	0.100	595
	Other, RF, All HDD Zones	0.034	-0.081	0.128	0.184	185
	Single, S, Low HDD Zone	0.080	-0.070	0.208	0.244	76
	Single, RNF, Low HDD Zone	0.124	-0.006	0.234	0.332	117
	Single, RF, Low HDD Zone	0.236	0.115	0.336	0.495	150
	Single, S, Med HDD Zone	0.221	0.066	0.355	0.675	68
	Single, RNF, Med HDD Zone	0.143	0.003	0.262	0.379	92
	Single, RF, Med HDD Zone	0.342	0.199	0.464	0.874	86
	Single, S, High HDD Zone	0.202	0.040	0.342	0.638	61
	Single, RNF, High HDD Zone	0.407	0.264	0.529	0.981	87
	Single, RF, High HDD Zone	0.511	0.393	0.608	1.211	166
		0.138	.	.	0.551	1892
Formaldehyde	Intercept (SFH,URBAN, All HDD Zones)	0.054	-0.347	0.455	0.226	209

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Other, RNF/S/U, All HDD Zones	0.060	-0.461	0.472	0.522	595
	Other, RF, All HDD Zones	0.179	-0.461	0.710	0.974	185
	Single, S, Low HDD Zone	0.542	-0.289	1.265	1.765	76
	Single, RNF, Low HDD Zone	0.608	-0.115	1.224	1.665	117
	Single, RF, Low HDD Zone	1.432	0.757	1.998	3.276	150
	Single, S, Med HDD Zone	1.174	0.311	1.930	3.499	68
	Single, RNF, Med HDD Zone	0.760	-0.020	1.431	2.316	92
	Single, RF, Med HDD Zone	1.740	0.943	2.429	5.369	86
	Single, S, High HDD Zone	0.664	-0.234	1.454	1.979	61
	Single, RNF, High HDD Zone	2.240	1.445	2.925	5.025	87
	Single, RF, High HDD Zone	2.699	2.042	3.248	6.864	166
		0.735	.	.	3.075	1892
Acetaldehyde	Intercept (SFH,URBAN, All HDD Zones)	0.060	-0.373	0.494	0.256	209
	Other, RNF/S/U, All HDD Zones	0.066	-0.499	0.510	0.567	595
	Other, RF, All HDD Zones	0.199	-0.495	0.772	1.055	185
	Single, S, Low HDD Zone	0.576	-0.324	1.356	1.857	76
	Single, RNF, Low HDD Zone	0.687	-0.097	1.351	1.813	117
	Single, RF, Low HDD Zone	1.553	0.821	2.163	3.466	150
	Single, S, Med HDD Zone	1.304	0.368	2.120	3.847	68
	Single, RNF, Med HDD Zone	0.844	-0.001	1.569	2.465	92
	Single, RF, Med HDD Zone	1.950	1.086	2.693	5.727	86
	Single, S, High HDD Zone	0.826	-0.148	1.678	2.417	61
	Single, RNF, High HDD Zone	2.472	1.611	3.212	5.535	87
	Single, RF, High HDD Zone	3.003	2.290	3.594	7.418	166
		0.816	.	.	3.333	1892
Acrolein	Intercept (SFH,URBAN, All HDD Zones)	7.02E-03	-4.33E-02	5.73E-02	2.98E-02	209
	Other, RNF/S/U, All HDD Zones	7.70E-03	-5.78E-02	5.91E-02	6.57E-02	595
	Other, RF, All HDD Zones	2.31E-02	-5.73E-02	8.95E-02	1.22E-01	185
	Single, S, Low HDD Zone	6.67E-02	-3.77E-02	1.57E-01	2.15E-01	76
	Single, RNF, Low HDD Zone	7.99E-02	-1.10E-02	1.57E-01	2.10E-01	117
	Single, RF, Low HDD Zone	1.80E-01	9.51E-02	2.51E-01	4.01E-01	150
	Single, S, Med HDD Zone	1.51E-01	4.29E-02	2.46E-01	4.46E-01	68
	Single, RNF, Med HDD Zone	9.80E-02	2.94E-05	1.82E-01	2.85E-01	92
	Single, RF, Med HDD Zone	2.27E-01	1.26E-01	3.13E-01	6.63E-01	86

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, S, High HDD Zone	9.67E-02	-1.61E-02	1.95E-01	2.83E-01	61
	Single, RNF, High HDD Zone	2.87E-01	1.87E-01	3.72E-01	6.42E-01	87
	Single, RF, High HDD Zone	3.49E-01	2.66E-01	4.17E-01	8.59E-01	166
		9.47E-02	.	.	3.86E-01	1892
Chloromethane	Intercept (SFH,URBAN, All HDD Zones)	3.86E-03	-2.45E-02	3.23E-02	1.62E-02	209
	Other, RNF/S/U, All HDD Zones	4.27E-03	-3.26E-02	3.34E-02	3.70E-02	595
	Other, RF, All HDD Zones	1.27E-02	-3.26E-02	5.03E-02	6.89E-02	185
	Single, S, Low HDD Zone	3.82E-02	-2.06E-02	8.94E-02	1.24E-01	76
	Single, RNF, Low HDD Zone	4.35E-02	-7.74E-03	8.71E-02	1.18E-01	117
	Single, RF, Low HDD Zone	1.02E-01	5.37E-02	1.42E-01	2.31E-01	150
	Single, S, Med HDD Zone	8.37E-02	2.25E-02	1.37E-01	2.49E-01	68
	Single, RNF, Med HDD Zone	5.42E-02	-1.08E-03	1.02E-01	1.63E-01	92
	Single, RF, Med HDD Zone	1.24E-01	6.78E-02	1.73E-01	3.79E-01	86
	Single, S, High HDD Zone	4.86E-02	-1.50E-02	1.05E-01	1.44E-01	61
	Single, RNF, High HDD Zone	1.59E-01	1.03E-01	2.08E-01	3.57E-01	87
	Single, RF, High HDD Zone	1.92E-01	1.46E-01	2.31E-01	4.86E-01	166
		5.24E-02	.	.	2.18E-01	1892
Methylene chloride	Intercept (SFH,URBAN, All HDD Zones)	0.016	-0.115	0.147	0.072	209
	Other, RNF/S/U, All HDD Zones	0.018	-0.151	0.155	0.172	595
	Other, RF, All HDD Zones	0.054	-0.154	0.229	0.323	185
	Single, S, Low HDD Zone	0.179	-0.091	0.417	0.597	76
	Single, RNF, Low HDD Zone	0.177	-0.059	0.380	0.551	117
	Single, RF, Low HDD Zone	0.456	0.236	0.643	1.108	150
	Single, S, Med HDD Zone	0.355	0.073	0.604	1.107	68
	Single, RNF, Med HDD Zone	0.229	-0.024	0.451	0.782	92
	Single, RF, Med HDD Zone	0.515	0.256	0.742	1.798	86
	Single, S, High HDD Zone	0.146	-0.146	0.407	0.542	61
	Single, RNF, High HDD Zone	0.686	0.428	0.912	1.586	87
	Single, RF, High HDD Zone	0.812	0.599	0.993	2.246	166
		0.222	.	.	1.001	1892
m,p-Xylenes	Intercept (SFH,URBAN, All HDD Zones)	6.53E-03	-3.91E-02	5.22E-02	2.87E-02	209
	Other, RNF/S/U, All HDD Zones	7.10E-03	-5.25E-02	5.36E-02	6.02E-02	595
	Other, RF, All HDD Zones	2.14E-02	-5.17E-02	8.15E-02	1.12E-01	185
	Single, S, Low HDD Zone	5.90E-02	-3.59E-02	1.41E-01	1.88E-01	76
	Single, RNF, Low HDD Zone	7.50E-02	-7.68E-03	1.45E-01	1.94E-01	117

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Low HDD Zone	1.62E-01	8.52E-02	2.26E-01	3.54E-01	150
	Single, S, Med HDD Zone	1.40E-01	4.13E-02	2.26E-01	4.12E-01	68
	Single, RNF, Med HDD Zone	9.06E-02	1.50E-03	1.67E-01	2.55E-01	92
	Single, RF, Med HDD Zone	2.11E-01	1.20E-01	2.89E-01	5.92E-01	86
	Single, S, High HDD Zone	9.83E-02	-4.21E-03	1.88E-01	2.90E-01	61
	Single, RNF, High HDD Zone	2.63E-01	1.73E-01	3.41E-01	5.94E-01	87
	Single, RF, High HDD Zone	3.23E-01	2.47E-01	3.85E-01	7.79E-01	166
		8.75E-02	.	.	3.51E-01	1892
Ethyl benzene	Intercept (SFH,URBAN, All HDD Zones)	2.81E-03	-1.70E-02	2.27E-02	1.22E-02	209
	Other, RNF/S/U, All HDD Zones	3.07E-03	-2.28E-02	2.33E-02	2.61E-02	595
	Other, RF, All HDD Zones	9.25E-03	-2.25E-02	3.54E-02	4.84E-02	185
	Single, S, Low HDD Zone	2.60E-02	-1.53E-02	6.16E-02	8.30E-02	76
	Single, RNF, Low HDD Zone	3.22E-02	-3.74E-03	6.25E-02	8.36E-02	117
	Single, RF, Low HDD Zone	7.08E-02	3.73E-02	9.87E-02	1.56E-01	150
	Single, S, Med HDD Zone	6.05E-02	1.76E-02	9.77E-02	1.78E-01	68
	Single, RNF, Med HDD Zone	3.91E-02	4.17E-04	7.22E-02	1.11E-01	92
	Single, RF, Med HDD Zone	9.09E-02	5.13E-02	1.25E-01	2.59E-01	86
	Single, S, High HDD Zone	4.09E-02	-3.68E-03	7.98E-02	1.20E-01	61
	Single, RNF, High HDD Zone	1.14E-01	7.47E-02	1.48E-01	2.56E-01	87
	Single, RF, High HDD Zone	1.39E-01	1.07E-01	1.66E-01	3.39E-01	166
		3.78E-02	.	.	1.53E-01	1892
Acetophenone	Intercept (SFH,URBAN, All HDD Zones)	9.18E-04	-5.55E-03	7.39E-03	3.97E-03	209
	Other, RNF/S/U, All HDD Zones	1.00E-03	-7.44E-03	7.61E-03	8.50E-03	595
	Other, RF, All HDD Zones	3.02E-03	-7.35E-03	1.15E-02	1.58E-02	185
	Single, S, Low HDD Zone	8.47E-03	-4.99E-03	2.01E-02	2.71E-02	76
	Single, RNF, Low HDD Zone	1.05E-02	-1.22E-03	2.04E-02	2.73E-02	117
	Single, RF, Low HDD Zone	2.31E-02	1.22E-02	3.22E-02	5.08E-02	150
	Single, S, Med HDD Zone	1.97E-02	5.73E-03	3.19E-02	5.80E-02	68
	Single, RNF, Med HDD Zone	1.28E-02	1.36E-04	2.36E-02	3.64E-02	92
	Single, RF, Med HDD Zone	2.96E-02	1.67E-02	4.07E-02	8.45E-02	86
	Single, S, High HDD Zone	1.33E-02	-1.20E-03	2.60E-02	3.91E-02	61
	Single, RNF, High HDD Zone	3.72E-02	2.43E-02	4.82E-02	8.36E-02	87
	Single, RF, High HDD Zone	4.54E-02	3.48E-02	5.42E-02	1.11E-01	166
		1.23E-02	.	.	4.98E-02	1892
o-Cresol	Intercept (SFH,URBAN, All HDD Zones)	7.16E-03	-4.33E-02	5.76E-02	3.09E-02	209

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Other, RNF/S/U, All HDD Zones	7.81E-03	-5.80E-02	5.93E-02	6.63E-02	595
	Other, RF, All HDD Zones	2.35E-02	-5.73E-02	9.00E-02	1.23E-01	185
	Single, S, Low HDD Zone	6.60E-02	-3.89E-02	1.57E-01	2.11E-01	76
	Single, RNF, Low HDD Zone	8.19E-02	-9.51E-03	1.59E-01	2.13E-01	117
	Single, RF, Low HDD Zone	1.80E-01	9.49E-02	2.51E-01	3.96E-01	150
	Single, S, Med HDD Zone	1.54E-01	4.47E-02	2.49E-01	4.52E-01	68
	Single, RNF, Med HDD Zone	9.95E-02	1.06E-03	1.84E-01	2.84E-01	92
	Single, RF, Med HDD Zone	2.31E-01	1.31E-01	3.18E-01	6.59E-01	86
	Single, S, High HDD Zone	1.04E-01	-9.37E-03	2.03E-01	3.05E-01	61
	Single, RNF, High HDD Zone	2.90E-01	1.90E-01	3.76E-01	6.52E-01	87
	Single, RF, High HDD Zone	3.54E-01	2.71E-01	4.23E-01	8.62E-01	166
		9.62E-02	.	.	3.88E-01	1892
m,p-Cresol	Intercept (SFH,URBAN, All HDD Zones)	0.027	-0.165	0.220	0.118	209
	Other, RNF/S/U, All HDD Zones	0.030	-0.221	0.226	0.253	595
	Other, RF, All HDD Zones	0.090	-0.218	0.343	0.469	185
	Single, S, Low HDD Zone	0.252	-0.148	0.597	0.805	76
	Single, RNF, Low HDD Zone	0.312	-0.036	0.606	0.811	117
	Single, RF, Low HDD Zone	0.687	0.362	0.957	1.511	150
	Single, S, Med HDD Zone	0.586	0.170	0.947	1.725	68
	Single, RNF, Med HDD Zone	0.379	0.004	0.700	1.081	92
	Single, RF, Med HDD Zone	0.881	0.498	1.210	2.513	86
	Single, S, High HDD Zone	0.396	-0.036	0.774	1.163	61
	Single, RNF, High HDD Zone	1.106	0.724	1.434	2.485	87
	Single, RF, High HDD Zone	1.351	1.034	1.613	3.287	166
		0.367	.	.	1.480	1892
Polychlorinated Biphenyls (PCBs)	Intercept (SFH,URBAN, All HDD Zones)	1.02E-06	-6.18E-06	8.23E-06	4.42E-06	209
	Other, RNF/S/U, All HDD Zones	1.11E-06	-8.28E-06	8.47E-06	9.47E-06	595
	Other, RF, All HDD Zones	3.36E-06	-8.18E-06	1.29E-05	1.76E-05	185
	Single, S, Low HDD Zone	9.43E-06	-5.55E-06	2.24E-05	3.01E-05	76
	Single, RNF, Low HDD Zone	1.17E-05	-1.36E-06	2.27E-05	3.04E-05	117
	Single, RF, Low HDD Zone	2.57E-05	1.35E-05	3.58E-05	5.66E-05	150
	Single, S, Med HDD Zone	2.19E-05	6.38E-06	3.55E-05	6.46E-05	68
	Single, RNF, Med HDD Zone	1.42E-05	1.51E-07	2.62E-05	4.05E-05	92
	Single, RF, Med HDD Zone	3.30E-05	1.86E-05	4.53E-05	9.41E-05	86

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, S, High HDD Zone	1.48E-05	-1.34E-06	2.90E-05	4.35E-05	61
	Single, RNF, High HDD Zone	4.14E-05	2.71E-05	5.37E-05	9.30E-05	87
	Single, RF, High HDD Zone	5.06E-05	3.87E-05	6.04E-05	1.23E-04	166
		1.37E-05	.	.	5.54E-05	1892
PCB Toxic Equivalent Quantity	Intercept (SFH,URBAN, All HDD Zones)	1.71E-13	-1.04E-12	1.38E-12	7.40E-13	209
	Other, RNF/S/U, All HDD Zones	1.87E-13	-1.39E-12	1.42E-12	1.59E-12	595
	Other, RF, All HDD Zones	5.63E-13	-1.37E-12	2.15E-12	2.95E-12	185
	Single, S, Low HDD Zone	1.58E-12	-9.31E-13	3.75E-12	5.05E-12	76
	Single, RNF, Low HDD Zone	1.96E-12	-2.28E-13	3.81E-12	5.09E-12	117
	Single, RF, Low HDD Zone	4.31E-12	2.27E-12	6.01E-12	9.49E-12	150
	Single, S, Med HDD Zone	3.68E-12	1.07E-12	5.95E-12	1.08E-11	68
	Single, RNF, Med HDD Zone	2.38E-12	2.54E-14	4.40E-12	6.79E-12	92
	Single, RF, Med HDD Zone	5.53E-12	3.12E-12	7.60E-12	1.58E-11	86
	Single, S, High HDD Zone	2.49E-12	-2.24E-13	4.86E-12	7.30E-12	61
	Single, RNF, High HDD Zone	6.94E-12	4.55E-12	9.00E-12	1.56E-11	87
	Single, RF, High HDD Zone	8.48E-12	6.49E-12	1.01E-11	2.06E-11	166
		2.30E-12	.	.	9.29E-12	1892
Hexachlorobenzene	Intercept (SFH,URBAN, All HDD Zones)	3.27E-08	-1.75E-07	2.41E-07	1.49E-07	209
	Other, RNF/S/U, All HDD Zones	2.75E-08	-2.47E-07	2.36E-07	2.65E-07	595
	Other, RF, All HDD Zones	7.77E-08	-2.59E-07	3.48E-07	4.96E-07	185
	Single, S, Low HDD Zone	2.34E-07	-2.02E-07	6.04E-07	7.09E-07	76
	Single, RNF, Low HDD Zone	2.00E-07	-1.80E-07	5.15E-07	6.95E-07	117
	Single, RF, Low HDD Zone	5.07E-07	1.52E-07	7.96E-07	1.37E-06	150
	Single, S, Med HDD Zone	5.07E-07	5.44E-08	8.94E-07	1.51E-06	68
	Single, RNF, Med HDD Zone	2.91E-07	-1.17E-07	6.35E-07	1.15E-06	92
	Single, RF, Med HDD Zone	6.35E-07	2.17E-07	9.87E-07	2.76E-06	86
	Single, S, High HDD Zone	1.99E-07	-2.72E-07	6.03E-07	8.59E-07	61
	Single, RNF, High HDD Zone	5.89E-07	1.72E-07	9.39E-07	1.89E-06	87
	Single, RF, High HDD Zone	1.11E-06	7.66E-07	1.39E-06	4.03E-06	166
		2.74E-07	.	.	1.56E-06	1892
2,3,7,8-Tetrachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.06E-11	-6.15E-11	8.27E-11	5.69E-11	209
	Other, RNF/S/U, All HDD Zones	1.12E-11	-8.32E-11	8.44E-11	1.01E-10	595
	Other, RF, All HDD Zones	3.43E-11	-8.15E-11	1.29E-10	1.85E-10	185
	Single, S, Low HDD Zone	7.98E-11	-7.04E-11	2.09E-10	2.44E-10	76
	Single, RNF, Low HDD Zone	1.25E-10	-5.60E-12	2.35E-10	3.35E-10	117

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Low HDD Zone	2.37E-10	1.15E-10	3.38E-10	4.97E-10	150
	Single, S, Med HDD Zone	2.22E-10	6.58E-11	3.57E-10	6.80E-10	68
	Single, RNF, Med HDD Zone	1.44E-10	2.77E-12	2.64E-10	3.82E-10	92
	Single, RF, Med HDD Zone	3.44E-10	2.00E-10	4.67E-10	8.78E-10	86
	Single, S, High HDD Zone	2.04E-10	4.16E-11	3.45E-10	6.47E-10	61
	Single, RNF, High HDD Zone	4.09E-10	2.66E-10	5.32E-10	9.89E-10	87
	Single, RF, High HDD Zone	5.14E-10	3.95E-10	6.12E-10	1.22E-09	166
		1.39E-10	.	.	5.55E-10	1892
1,2,3,7,8-Pentachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.24E-11	-7.19E-11	9.67E-11	6.41E-11	209
	Other, RNF/S/U, All HDD Zones	1.32E-11	-9.73E-11	9.88E-11	1.17E-10	595
	Other, RF, All HDD Zones	4.03E-11	-9.52E-11	1.51E-10	2.14E-10	185
	Single, S, Low HDD Zone	9.67E-11	-7.91E-11	2.48E-10	2.98E-10	76
	Single, RNF, Low HDD Zone	1.46E-10	-7.02E-12	2.75E-10	3.85E-10	117
	Single, RF, Low HDD Zone	2.83E-10	1.40E-10	4.01E-10	5.94E-10	150
	Single, S, Med HDD Zone	2.61E-10	7.85E-11	4.19E-10	7.91E-10	68
	Single, RNF, Med HDD Zone	1.69E-10	4.17E-12	3.09E-10	4.50E-10	92
	Single, RF, Med HDD Zone	4.03E-10	2.34E-10	5.47E-10	1.04E-09	86
	Single, S, High HDD Zone	2.30E-10	4.03E-11	3.95E-10	7.20E-10	61
	Single, RNF, High HDD Zone	4.83E-10	3.15E-10	6.26E-10	1.15E-09	87
	Single, RF, High HDD Zone	6.04E-10	4.65E-10	7.19E-10	1.43E-09	166
		1.63E-10	.	.	6.49E-10	1892
1,2,3,4,7,8-Hexachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.28E-11	-7.46E-11	1.00E-10	6.24E-11	209
	Other, RNF/S/U, All HDD Zones	1.37E-11	-1.01E-10	1.02E-10	1.19E-10	595
	Other, RF, All HDD Zones	4.18E-11	-9.86E-11	1.56E-10	2.19E-10	185
	Single, S, Low HDD Zone	1.05E-10	-7.69E-11	2.61E-10	3.27E-10	76
	Single, RNF, Low HDD Zone	1.50E-10	-8.78E-12	2.83E-10	3.88E-10	117
	Single, RF, Low HDD Zone	3.01E-10	1.53E-10	4.23E-10	6.37E-10	150
	Single, S, Med HDD Zone	2.71E-10	8.23E-11	4.35E-10	8.10E-10	68
	Single, RNF, Med HDD Zone	1.76E-10	4.95E-12	3.21E-10	4.72E-10	92
	Single, RF, Med HDD Zone	4.16E-10	2.41E-10	5.65E-10	1.10E-09	86
	Single, S, High HDD Zone	2.23E-10	2.68E-11	3.94E-10	6.84E-10	61
	Single, RNF, High HDD Zone	5.05E-10	3.31E-10	6.53E-10	1.17E-09	87
	Single, RF, High HDD Zone	6.28E-10	4.83E-10	7.46E-10	1.48E-09	166
		1.70E-10	.	.	6.73E-10	1892

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
1,2,3,6,7,8-Hexachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.28E-11	-7.46E-11	1.00E-10	6.24E-11	209
	Other, RNF/S/U, All HDD Zones	1.37E-11	-1.01E-10	1.02E-10	1.19E-10	595
	Other, RF, All HDD Zones	4.18E-11	-9.86E-11	1.56E-10	2.19E-10	185
	Single, S, Low HDD Zone	1.05E-10	-7.69E-11	2.61E-10	3.27E-10	76
	Single, RNF, Low HDD Zone	1.50E-10	-8.78E-12	2.83E-10	3.88E-10	117
	Single, RF, Low HDD Zone	3.01E-10	1.53E-10	4.23E-10	6.37E-10	150
	Single, S, Med HDD Zone	2.71E-10	8.23E-11	4.35E-10	8.10E-10	68
	Single, RNF, Med HDD Zone	1.76E-10	4.95E-12	3.21E-10	4.72E-10	92
	Single, RF, Med HDD Zone	4.16E-10	2.41E-10	5.65E-10	1.10E-09	86
	Single, S, High HDD Zone	2.23E-10	2.68E-11	3.94E-10	6.84E-10	61
	Single, RNF, High HDD Zone	5.05E-10	3.31E-10	6.53E-10	1.17E-09	87
	Single, RF, High HDD Zone	6.28E-10	4.83E-10	7.46E-10	1.48E-09	166
		1.70E-10	.	.	6.73E-10	1892
1,2,3,7,8,9-Hexachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.28E-11	-7.46E-11	1.00E-10	6.24E-11	209
	Other, RNF/S/U, All HDD Zones	1.37E-11	-1.01E-10	1.02E-10	1.19E-10	595
	Other, RF, All HDD Zones	4.18E-11	-9.86E-11	1.56E-10	2.19E-10	185
	Single, S, Low HDD Zone	1.05E-10	-7.69E-11	2.61E-10	3.27E-10	76
	Single, RNF, Low HDD Zone	1.50E-10	-8.78E-12	2.83E-10	3.88E-10	117
	Single, RF, Low HDD Zone	3.01E-10	1.53E-10	4.23E-10	6.37E-10	150
	Single, S, Med HDD Zone	2.71E-10	8.23E-11	4.35E-10	8.10E-10	68
	Single, RNF, Med HDD Zone	1.76E-10	4.95E-12	3.21E-10	4.72E-10	92
	Single, RF, Med HDD Zone	4.16E-10	2.41E-10	5.65E-10	1.10E-09	86
	Single, S, High HDD Zone	2.23E-10	2.68E-11	3.94E-10	6.84E-10	61
	Single, RNF, High HDD Zone	5.05E-10	3.31E-10	6.53E-10	1.17E-09	87
	Single, RF, High HDD Zone	6.28E-10	4.83E-10	7.46E-10	1.48E-09	166
		1.70E-10	.	.	6.73E-10	1892
1,2,3,4,6,7,8-Heptachloro Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	1.76E-11	-1.04E-10	1.39E-10	8.04E-11	209
	Other, RNF/S/U, All HDD Zones	1.90E-11	-1.40E-10	1.43E-10	1.62E-10	595
	Other, RF, All HDD Zones	5.77E-11	-1.37E-10	2.17E-10	3.00E-10	185
	Single, S, Low HDD Zone	1.53E-10	-9.98E-11	3.71E-10	4.83E-10	76
	Single, RNF, Low HDD Zone	2.04E-10	-1.65E-11	3.89E-10	5.24E-10	117
	Single, RF, Low HDD Zone	4.28E-10	2.22E-10	5.98E-10	9.21E-10	150
	Single, S, Med HDD Zone	3.76E-10	1.13E-10	6.03E-10	1.11E-09	68
	Single, RNF, Med HDD Zone	2.43E-10	5.92E-12	4.46E-10	6.69E-10	92
	Single, RF, Med HDD Zone	5.71E-10	3.28E-10	7.78E-10	1.56E-09	86

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, S, High HDD Zone	2.83E-10	9.40E-12	5.21E-10	8.44E-10	61
	Single, RNF, High HDD Zone	7.04E-10	4.62E-10	9.11E-10	1.60E-09	87
	Single, RF, High HDD Zone	8.68E-10	6.67E-10	1.03E-09	2.07E-09	166
		2.35E-10	.	.	9.35E-10	1892
Octachloro-Dibenzo-p-dioxin	Intercept (SFH,URBAN, All HDD Zones)	5.26E-11	-3.50E-10	4.55E-10	2.22E-10	209
	Other, RNF/S/U, All HDD Zones	5.86E-11	-4.62E-10	4.74E-10	5.24E-10	595
	Other, RF, All HDD Zones	1.74E-10	-4.66E-10	7.09E-10	9.79E-10	185
	Single, S, Low HDD Zone	5.48E-10	-2.84E-10	1.27E-09	1.80E-09	76
	Single, RNF, Low HDD Zone	5.86E-10	-1.38E-10	1.21E-09	1.67E-09	117
	Single, RF, Low HDD Zone	1.43E-09	7.52E-10	2.00E-09	3.33E-09	150
	Single, S, Med HDD Zone	1.15E-09	2.83E-10	1.91E-09	3.47E-09	68
	Single, RNF, Med HDD Zone	7.43E-10	-3.81E-11	1.42E-09	2.35E-09	92
	Single, RF, Med HDD Zone	1.69E-09	8.91E-10	2.38E-09	5.44E-09	86
	Single, S, High HDD Zone	5.86E-10	-3.13E-10	1.38E-09	1.82E-09	61
	Single, RNF, High HDD Zone	2.20E-09	1.41E-09	2.89E-09	4.97E-09	87
	Single, RF, High HDD Zone	2.64E-09	1.98E-09	3.19E-09	6.89E-09	166
		7.18E-10	.	.	3.08E-09	1892
2,3,7,8-Tetrachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	5.15E-11	-3.10E-10	4.13E-10	3.21E-10	209
	Other, RNF/S/U, All HDD Zones	5.34E-11	-4.18E-10	4.22E-10	5.32E-10	595
	Other, RF, All HDD Zones	1.66E-10	-4.13E-10	6.42E-10	9.70E-10	185
	Single, S, Low HDD Zone	3.42E-10	-4.10E-10	9.90E-10	1.02E-09	76
	Single, RNF, Low HDD Zone	6.22E-10	-3.30E-11	1.17E-09	1.79E-09	117
	Single, RF, Low HDD Zone	1.08E-09	4.65E-10	1.58E-09	2.29E-09	150
	Single, S, Med HDD Zone	1.07E-09	2.86E-10	1.74E-09	3.46E-09	68
	Single, RNF, Med HDD Zone	6.92E-10	-1.36E-11	1.29E-09	1.87E-09	92
	Single, RF, Med HDD Zone	1.68E-09	9.61E-10	2.30E-09	4.24E-09	86
	Single, S, High HDD Zone	1.13E-09	3.13E-10	1.83E-09	3.75E-09	61
	Single, RNF, High HDD Zone	1.94E-09	1.22E-09	2.56E-09	5.06E-09	87
	Single, RF, High HDD Zone	2.48E-09	1.88E-09	2.97E-09	6.06E-09	166
		6.68E-10	.	.	2.77E-09	1892
1,2,3,7,8-Pentachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	1.79E-11	-1.10E-10	1.46E-10	1.19E-10	209
	Other, RNF/S/U, All HDD Zones	1.84E-11	-1.49E-10	1.50E-10	1.93E-10	595
	Other, RF, All HDD Zones	5.75E-11	-1.48E-10	2.27E-10	3.51E-10	185
	Single, S, Low HDD Zone	1.12E-10	-1.55E-10	3.42E-10	3.28E-10	76
	Single, RNF, Low HDD Zone	2.18E-10	-1.43E-11	4.14E-10	6.54E-10	117

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RF, Low HDD Zone	3.62E-10	1.46E-10	5.43E-10	7.86E-10	150
	Single, S, Med HDD Zone	3.69E-10	9.19E-11	6.10E-10	1.23E-09	68
	Single, RNF, Med HDD Zone	2.39E-10	-1.09E-11	4.53E-10	6.62E-10	92
	Single, RF, Med HDD Zone	5.86E-10	3.30E-10	8.05E-10	1.49E-09	86
	Single, S, High HDD Zone	4.11E-10	1.23E-10	6.63E-10	1.40E-09	61
	Single, RNF, High HDD Zone	6.67E-10	4.12E-10	8.86E-10	1.81E-09	87
	Single, RF, High HDD Zone	8.58E-10	6.47E-10	1.03E-09	2.14E-09	166
		2.31E-10	.	.	9.82E-10	1892
2,3,4,7,8-Pentachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	2.45E-11	-1.54E-10	2.03E-10	1.70E-10	209
	Other, RNF/S/U, All HDD Zones	2.51E-11	-2.07E-10	2.09E-10	2.72E-10	595
	Other, RF, All HDD Zones	7.86E-11	-2.07E-10	3.15E-10	4.95E-10	185
	Single, S, Low HDD Zone	1.46E-10	-2.25E-10	4.68E-10	4.27E-10	76
	Single, RNF, Low HDD Zone	3.00E-10	-2.32E-11	5.74E-10	9.28E-10	117
	Single, RF, Low HDD Zone	4.85E-10	1.84E-10	7.38E-10	1.07E-09	150
	Single, S, Med HDD Zone	5.03E-10	1.18E-10	8.40E-10	1.72E-09	68
	Single, RNF, Med HDD Zone	3.26E-10	-2.19E-11	6.25E-10	9.22E-10	92
	Single, RF, Med HDD Zone	8.03E-10	4.47E-10	1.11E-09	2.06E-09	86
	Single, S, High HDD Zone	5.82E-10	1.81E-10	9.34E-10	2.00E-09	61
	Single, RNF, High HDD Zone	9.06E-10	5.52E-10	1.21E-09	2.52E-09	87
	Single, RF, High HDD Zone	1.17E-09	8.79E-10	1.42E-09	2.98E-09	166
		3.15E-10	.	.	1.37E-09	1892
1,2,3,4,7,8-Hexachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	1.97E-11	-1.16E-10	1.55E-10	8.99E-11	209
	Other, RNF/S/U, All HDD Zones	2.12E-11	-1.56E-10	1.59E-10	1.81E-10	595
	Other, RF, All HDD Zones	6.43E-11	-1.53E-10	2.42E-10	3.34E-10	185
	Single, S, Low HDD Zone	1.71E-10	-1.12E-10	4.13E-10	5.38E-10	76
	Single, RNF, Low HDD Zone	2.28E-10	-1.81E-11	4.34E-10	5.85E-10	117
	Single, RF, Low HDD Zone	4.77E-10	2.48E-10	6.67E-10	1.03E-09	150
	Single, S, Med HDD Zone	4.19E-10	1.26E-10	6.73E-10	1.24E-09	68
	Single, RNF, Med HDD Zone	2.71E-10	6.70E-12	4.97E-10	7.45E-10	92
	Single, RF, Med HDD Zone	6.37E-10	3.66E-10	8.68E-10	1.73E-09	86
	Single, S, High HDD Zone	3.17E-10	1.19E-11	5.82E-10	9.46E-10	61
	Single, RNF, High HDD Zone	7.85E-10	5.16E-10	1.02E-09	1.79E-09	87
	Single, RF, High HDD Zone	9.68E-10	7.44E-10	1.15E-09	2.31E-09	166
		2.62E-10	.	.	1.04E-09	1892
1,2,3,6,7,8-Hexachloro-	Intercept (SFH,URBAN, All HDD Zones)	1.07E-11	-6.23E-11	8.38E-11	5.48E-11	209

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
Dibenzofuran	Other, RNF/S/U, All HDD Zones	1.14E-11	-8.42E-11	8.56E-11	1.01E-10	595
	Other, RF, All HDD Zones	3.49E-11	-8.24E-11	1.31E-10	1.85E-10	185
	Single, S, Low HDD Zone	8.45E-11	-6.76E-11	2.15E-10	2.61E-10	76
	Single, RNF, Low HDD Zone	1.26E-10	-6.26E-12	2.38E-10	3.31E-10	117
	Single, RF, Low HDD Zone	2.46E-10	1.23E-10	3.49E-10	5.18E-10	150
	Single, S, Med HDD Zone	2.26E-10	6.82E-11	3.63E-10	6.83E-10	68
	Single, RNF, Med HDD Zone	1.47E-10	3.78E-12	2.68E-10	3.90E-10	92
	Single, RF, Med HDD Zone	3.49E-10	2.03E-10	4.73E-10	9.03E-10	86
	Single, S, High HDD Zone	1.97E-10	3.26E-11	3.40E-10	6.13E-10	61
	Single, RNF, High HDD Zone	4.19E-10	2.74E-10	5.43E-10	9.91E-10	87
	Single, RF, High HDD Zone	5.24E-10	4.03E-10	6.23E-10	1.24E-09	166
		1.42E-10	.	.	5.62E-10	1892
1,2,3,7,8,9-Hexachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	9.82E-12	-5.70E-11	7.66E-11	4.93E-11	209
	Other, RNF/S/U, All HDD Zones	1.05E-11	-7.70E-11	7.83E-11	9.17E-11	595
	Other, RF, All HDD Zones	3.19E-11	-7.53E-11	1.20E-10	1.69E-10	185
	Single, S, Low HDD Zone	7.83E-11	-6.08E-11	1.98E-10	2.42E-10	76
	Single, RNF, Low HDD Zone	1.15E-10	-5.99E-12	2.17E-10	3.01E-10	117
	Single, RF, Low HDD Zone	2.27E-10	1.14E-10	3.20E-10	4.78E-10	150
	Single, S, Med HDD Zone	2.07E-10	6.26E-11	3.32E-10	6.23E-10	68
	Single, RNF, Med HDD Zone	1.34E-10	3.62E-12	2.45E-10	3.58E-10	92
	Single, RF, Med HDD Zone	3.19E-10	1.85E-10	4.33E-10	8.29E-10	86
	Single, S, High HDD Zone	1.77E-10	2.69E-11	3.08E-10	5.48E-10	61
	Single, RNF, High HDD Zone	3.84E-10	2.51E-10	4.98E-10	9.03E-10	87
	Single, RF, High HDD Zone	4.79E-10	3.69E-10	5.70E-10	1.13E-09	166
		1.30E-10	.	.	5.14E-10	1892
2,3,4,6,7,8-Hexachloro-Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	8.61E-12	-5.02E-11	6.74E-11	4.13E-11	209
	Other, RNF/S/U, All HDD Zones	9.23E-12	-6.77E-11	6.89E-11	7.95E-11	595
	Other, RF, All HDD Zones	2.81E-11	-6.63E-11	1.05E-10	1.47E-10	185
	Single, S, Low HDD Zone	7.15E-11	-5.09E-11	1.77E-10	2.23E-10	76
	Single, RNF, Low HDD Zone	1.00E-10	-6.29E-12	1.90E-10	2.59E-10	117
	Single, RF, Low HDD Zone	2.04E-10	1.04E-10	2.86E-10	4.33E-10	150
	Single, S, Med HDD Zone	1.83E-10	5.53E-11	2.93E-10	5.43E-10	68
	Single, RNF, Med HDD Zone	1.18E-10	3.32E-12	2.16E-10	3.19E-10	92
	Single, RF, Med HDD Zone	2.79E-10	1.62E-10	3.79E-10	7.40E-10	86
	Single, S, High HDD Zone	1.47E-10	1.51E-11	2.62E-10	4.48E-10	61

Pollutant	Category	Mean	Lower Bound	Upper Bound	Standard Deviation	N
	Single, RNF, High HDD Zone	3.40E-10	2.23E-10	4.40E-10	7.86E-10	87
	Single, RF, High HDD Zone	4.22E-10	3.25E-10	5.02E-10	9.99E-10	166
		1.14E-10	.	.	4.53E-10	1892
1,2,3,4,6,7,8-Heptachloro Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	1.72E-11	-1.02E-10	1.36E-10	7.69E-11	209
	Other, RNF/S/U, All HDD Zones	1.86E-11	-1.37E-10	1.40E-10	1.58E-10	595
	Other, RF, All HDD Zones	5.63E-11	-1.35E-10	2.13E-10	2.93E-10	185
	Single, S, Low HDD Zone	1.52E-10	-9.57E-11	3.66E-10	4.83E-10	76
	Single, RNF, Low HDD Zone	1.98E-10	-1.80E-11	3.80E-10	5.10E-10	117
	Single, RF, Low HDD Zone	4.22E-10	2.21E-10	5.90E-10	9.15E-10	150
	Single, S, Med HDD Zone	3.67E-10	1.10E-10	5.91E-10	1.08E-09	68
	Single, RNF, Med HDD Zone	2.38E-10	4.99E-12	4.36E-10	6.61E-10	92
	Single, RF, Med HDD Zone	5.56E-10	3.18E-10	7.60E-10	1.54E-09	86
	Single, S, High HDD Zone	2.67E-10	-7.71E-13	5.01E-10	7.92E-10	61
	Single, RNF, High HDD Zone	6.90E-10	4.53E-10	8.93E-10	1.56E-09	87
	Single, RF, High HDD Zone	8.47E-10	6.51E-10	1.01E-09	2.03E-09	166
		2.30E-10	.	.	9.18E-10	1892
1,2,3,4,7,8,9-Heptachloro Dibenzofuran	Intercept (SFH,URBAN, All HDD Zones)	1.19E-11	-6.94E-11	9.33E-11	5.83E-11	209
	Other, RNF/S/U, All HDD Zones	1.28E-11	-9.37E-11	9.54E-11	1.11E-10	595
	Other, RF, All HDD Zones	3.89E-11	-9.17E-11	1.46E-10	2.04E-10	185
	Single, S, Low HDD Zone	9.76E-11	-7.18E-11	2.43E-10	3.04E-10	76
	Single, RNF, Low HDD Zone	1.40E-10	-8.08E-12	2.63E-10	3.61E-10	117
	Single, RF, Low HDD Zone	2.80E-10	1.42E-10	3.94E-10	5.92E-10	150
	Single, S, Med HDD Zone	2.53E-10	7.66E-11	4.05E-10	7.54E-10	68
	Single, RNF, Med HDD Zone	1.64E-10	4.60E-12	2.99E-10	4.39E-10	92
	Single, RF, Med HDD Zone	3.87E-10	2.25E-10	5.26E-10	1.02E-09	86
	Single, S, High HDD Zone	2.09E-10	2.57E-11	3.68E-10	6.39E-10	61
	Single, RNF, High HDD Zone	4.70E-10	3.08E-10	6.08E-10	1.09E-09	87
	Single, RF, High HDD Zone	5.84E-10	4.50E-10	6.94E-10	1.38E-09	166
		1.58E-10	.	.	6.26E-10	1892

Appendix G: EPA's methodology for calculating HAPs from Residential Heating Using Wood (Fireplaces, Inserts, and Woodstoves), (SCCs: 2104008001, 2104008002, 2104008003, 2104008004, 2104008010, 2104008030, and 2104008050)

EPA calculated the emission estimates for the preliminary 2002 NEI. The emission estimation methodology for these source categories was taken directly from the results of a study by EFIG.[1] Emissions associated with residential heating with wood are estimated for seven types of equipment and reported under the following SCCs:

- Fireplaces: Without Inserts (SCC: 2104008001);
- Fireplaces: Inserts - Catalytic, non-EPA-certified (SCC: 2104008002);
- Fireplaces: Inserts - Non-catalytic, EPA-certified (SCC: 2104008003);
- Fireplaces: Inserts - Catalytic, EPA-certified (SCC: 2104008004);
- Woodstoves - Conventional (SCC: 2104008010);
- Woodstoves - Catalytic (SCC: 2104008030); and
- Woodstoves - Non-catalytic (SCC: 2104008050).

The following is a summary of the study's methods.

Activity Data

Appendix C [of EPA's Preliminary NEI documentation for HAPs] contains the final activity data(wood consumption by type of combustion device) that was developed for residential heating using wood. The following steps were taken to estimate the national and county-level activity data for this category:

1. **Use the 2001 national activity data to extrapolate national activity data for 2002.** The activity data for residential wood combustion (RWC) were estimated based on the type of combustion unit. Table G-1 identifies the steps followed to estimate the national number of fireplaces without inserts, and the national amount of cordwood burned in the fireplaces. Table G-2 shows the steps followed to estimate the national number of wood stoves and fireplaces with inserts, and the national amount of cordwood burned in these combustion units. The national number of fireplaces without inserts, fireplaces with inserts, and wood stoves was taken from the 2001 *American Housing Survey for the United States* (AHS)[2], which is released every two years. The national numbers were adjusted to account for the number of usable fireplaces and wood stoves that are used to burn wood (see Tables G-1 and G-2). Cordwood consumption was then estimated for each of these three types of equipment. The 2001 national cordwood consumption was then adjusted to 2002 national cordwood consumption using a ratio of national heating demand for both years (see Tables G-1 and G-2).[3]

2. **Group all counties into one of five climate zones to address wood consumption differences due to temperature.** The extent of wood consumption in residential combustion units is directly related to temperature – in colder climates more wood is consumed. The second step in the method was to use historical climate data to assign each county in the country to one of five climate zones. The climate zones are defined by the National Climatic Data Center and are based on heating degree day (HDD) and cooling degree day (CDD) data. Each climate zone was then assigned a percentage of total national wood consumption based on information contained in the Energy Information Administration's Residential Energy Consumption database.[4] The following shows the percentage of national wood consumption allocated to each climate zone.

Climate Zone	Percent of Wood Consumed
1 (>7000 HDD)	36
2 (5500-7000 HDD)	19
3 (4000-5499 HDD)	21
4 (<4000 HDD and <2000 CDD)	15
5 (<4000 HDD and >2000 CDD)	9

Table G-1. Methods for Estimating National Wood Consumption for Fireplaces Without Inserts

Step	Description	Calculation Step	Reference	Total
1	Number of homes with usable fireplaces (inserts and no inserts)		2001 American Housing Survey (Table 2-25; SelectedAmenities, Usable Fireplaces)(http://www.census.gov/hhes/www/housing/ahs/ahs01/tab225.html)	35,097,000
2	Number of usable fireplaces (inserts and no inserts)	Multiply Step 1 by factor (1.17) for more than 1 unit per home	US Consumer Product Safety Commission, March 1989	41,063,490
3	Number of usable fireplaces burning wood (as opposed to gas)	Multiply Step 2 by factor (0.74) to estimate number of units burning wood	Houck, Based on industry sales data from Hearth Products, Vista Marketing, and Industry reps.	30,386,983
4	Number of wood burning, usable fireplaces actually in use	Multiply Step 3 by factor (0.58) to estimate the number of fireplaces in use	Houck, Based on five local surveys, Vista Marketing Research survey, US Consumer Product Safety report and on a3/97 Housing economics article.	17,624,450
5	Number of homes with fireplaces with inserts, used for main heating		2001 American Housing Survey Table 2-4) (http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)	145,000
6	Number of homes with fireplaces with inserts, used for other heating		(2001 American Housing Survey (Table 2-4)(http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)	4,937,000
7	Total number of homes with fireplaces with inserts, used for heating	Sum of Steps 5 and 6		5,082,000
8	Total number of fireplaces with inserts, used for heating	Multiply Step 7 by factor (1.10) for more than 1 unit per home	US Consumer Product Safety Commission, March 1989	5,590,200
9	Total fireplaces without inserts burning wood	Step 4 minus Step 8		12,034,250
10	Number of homes with fireplaces (no inserts) used for main heating		2001 American Housing Survey (Table 2-4)(http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)2001	64,000
11	Number of homes with fireplaces (no inserts) used for other heating		American Housing Survey (Table 2-4)(http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)	4,055,000
12	Total number of homes with fireplaces (no inserts) used for heating	Sum of Steps 10 and 11		4,119,000

Step	Description	Calculation Step	Reference	Total
13	Total number of fireplaces (no inserts) used for heating	Multiply Step 12 by factor (1.17) for more than 1 unit per home	US Consumer Product Safety Commission, March 1989	4,819,230
14	Number of fireplaces used for aesthetics and pleasure	Step 9 minus Step 13		7,215,020
15	Cords consumed in fireplaces without inserts used for heating	Step 13 times 0.656 cords/unit/yr (woodconsumption rate for fireplacesw/o inserts used for heating)		3,161,415
16	Cords consumed in fireplaces without inserts used for aesthetics and pleasure	Step 14 times 0.069 cords/unit/yr (wood consumption rate for fireplaces w/o inserts used for aesthetics and pleasure)		497,836
17	Total cords consumed in fireplaces without inserts	Sum of Steps 15 and 16		3,659,251
18	Dry weight wax/sawdust fireplace logs (tons)	Calculating the 2 year percentage increase from 1997 to 1999 then applying that increase to estimate 2001.	Houck 2001b. *Recommended Procedure for Compiling Emission Inventory Data For Manufactured Wax/Sawdust Fireplace Logs.* Houck 2001b.	263,695
19	Approximate cordwood equivalent value for wax/sawdust fireplace logs used in 2001 (dry tons)	Multiply Step 18 by 4.49	*Recommended Procedure for Compiling Emission Inventory Data For Manufactured Wax/Sawdust Fireplace Logs.*	1,183,991
20	Cordwood value adjusted for wax/sawdust fireplace log use 2001	Subtract Step 19 from 17		2,475,261
21	Cordwood value adjusted forwax/sawdust fireplace log use 2002	Multiply Step 20 times amount of cordwood used in 2002/2001(350/407 Trillion BTU)	EIA. Estimated Renewable Energy Consumption: Residential and Commercial Sectors. Table 10.2a. Monthly Energy Review. August, 2003.This table has both the 2001and 2002 fuel consumption from residential wood (in trillion BTU)	2,128,603

Table G-2. Methods for Estimating National Wood Consumption for Fireplaces with Inserts and Woodstoves

Step	Description	Calculation Step	Reference	Total
1	Number of homes with woodstoves used for main heating		2001 American Housing Survey Table 2-4) (http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)	1,137,000
2	Number of homes with woodstoves used for other heating		(2001 American Housing Survey (Table 2-4) (http://www.census.gov/hhes/www/housing/ahs/ahs01/tab24.html)	4,834,000
3	Total number of homes with woodstoves used for heating	Sum of Steps 1 and 2		5,971,000
4	Total number of woodstoves used for heating	Multiply Step 3 by factor (1.09) for more than 1 unit per home	US Consumer Product Safety Commission, March 1989	6,508,390
5	Number of homes with fireplaces with inserts, used for main heating		From Table 1, Step 5	145,000
6	Number of homes with fireplaces with inserts, used for other heating		From Table 1, Step 6	4,937,000
7	Total number of homes with	Sum of Steps 5 and 6	From Table 1, Step 7	5,082,000
8	Total number fireplaces with fireplaces with inserts	Multiply Step 7 by factor 1.10) for more than 1 unit per home	US Consumer Product Safety Commission, March 1989	5,590,200
9	Total number of fireplaces with inserts and woodstoves	Sum of Steps 4 plus 8		12,098,590
10	Total cords of wood consumed by residential sector (doesn't include consumption for aesthetics or pleasure)		1997 Data from EIA Renewable Energy Annual (Dec 1998). The EIA discontinued publication of this estimate after 1997. Consequently, the 1997 estimate was not adjusted to 2002 because of the lack of data.	21,700,000
11	Cords consumed in fireplaces without inserts used for heating		From Table 1, Step 15	3,161,415
12	Total cords of wood consumed by residential sector in woodstoves/fireplaces with inserts	Step 10 minus Step 11		18,538,585
13	Cords consumed per woodstove/insert unit per year	Step 12 divided by Step 9		1.533
14	Cords consumed in fireplaces with inserts in 2001	Step 13 times Step 8		8,565,824
15	Cords consumed in woodstoves in 2001	Step 13 times Step 4		9,972,761

Step	Description	Calculation Step	Reference	Total
16	Cords consumed in fireplaces with inserts in 2002	Multiply Step 14 times amount of cordwood used in 2002/2001 (350/407 Trillion BTU)	EIA. Estimated Renewable Energy Consumption: Residential and Commercial Sectors. Table 10.2a. Monthly Energy Review. August, 2003. This table has both the 2001 and 2002 fuel consumption from residential wood (in trillion BTU)	7,366,188
17	Cords consumed in woodstoves in 2002	Multiply Step 15 times amount of cordwood used in 2002/2001 (350/407 Trillion BTU)	EIA. Estimated Renewable Energy Consumption: Residential and Commercial Sectors. Table 10.2a. Monthly Energy Review. August, 2003. This table has both the 2001 and 2002 fuel consumption from residential wood (in trillion BTU)	8,576,084

3. **Allocate the consumption level in each zone to individual counties in that zone.** The next step in the procedure was to allocate the wood consumption in each climate zone to individual counties in that zone. This was accomplished using the relative percent of detached single-family homes in each county compared to the number of detached single-family homes in the entire climate zone. The number of detached single-family homes by county was obtained from year 2000 Census data.[5] The county-level housing data are presented in Appendix B [of EPA's Preliminary NEI documentation for HAPs] by state and county FIPS and climate zone.

4. **Designate each county as urban or rural.** Each county was then designated as urban or rural in order to reflect equipment usage patterns. The U.S. Bureau of Census classifies a county as rural if less than 50% of its population is located in cities and towns, and urban if more than 50% of its population is located in cities and towns. During preparation of the 2002 RWC emissions inventory, 1999 was the latest year for which rural and urban classification were available for counties.

5. **Adjust urban and rural wood consumption to match AHS data.** In each zone, the total urban and rural county wood consumption was summed. If the urban and rural totals did not match the expected percent split for that combustion unit as described in the AHS data, then an adjustment was made within the zone for each county's consumption. The 2001 AHS shows that each type of combustion unit occurs preferentially in urban and rural areas. [2] The percent of combustion units found in urban and rural areas was used as a surrogate for wood consumption. AHS estimated that 73% of fireplaces without inserts are found in urban areas compared to 27% in rural areas. For woodstoves, AHS estimated that 65% of the woodstoves are found in rural areas compared to 35% in urban areas. For fireplaces with inserts, AHS estimated that 57% of the inserts are found in urban areas compared to 43% in rural areas. The following Table G-3 shows how the percentages were derived from the 2001 AHS data:

6. **Allocate wood consumption to equipment types designated by SCC.** Wood consumption in fireplaces without inserts was placed on SCC 2104008001. Total wood consumption for woodstoves and fireplaces with inserts were apportioned as follows:

Type of Device	SCCs for Fireplaces with Inserts	SCCs for Woodstoves	Percent of Total Wood Consumption
Non-certified	2104008002	2104008010	92
Certified non-catalytic	2104008003	2104008050	5.7
Certified catalytic	2104008004	2104008030	2.3

Table G-3. Calculation of Urban Versus Rural Distribution of Fireplaces Without Inserts, Fireplaces With Inserts, and Woodstoves

		2001 National Number of Occupied Housing Units(1,000)		
Type of Heating/ Geographic Location		**Fireplaces Without Inserts**	**Fireplaces With Inserts**	**Woodstoves**
Main	Urban	33	61	192
	Rural	31	84	939
Other Heating	Urban	2,985	2,840	1,910
	Rural	1,071	2,097	2,924
Total Heating	Urban	3,018	2,901	2,102
	Rural	1,102	2,181	3,863
	% Urban	73%	57%	35%
	% Rural	27%	43%	65%

From second page of Table 2-4 (Selected Equipment and Plumbing Occupied Units) of 2001 *American Housing Survey for the United States* (pdf file).

The steps described above resulted in final cordwood consumption by county. Cordwood was converted to tons of wood before estimating emissions using a conversion factor of one cord of wood equaling 1.163 tons. [6] The wood consumption estimates for stoves and inserts were further divided to account for the different designs of units that exist in the marketplace. The different designs of stoves/inserts have been found to have different levels of emissions. Based on data received from the Hearth Products Association[7], three primary types of units are in use: non-certified, which constitute 92% of the stoves manufactured; certified, non-catalytic (5.7%); and catalytic (2.3%). These splits were applied to the national, state, and county cordwood consumption estimates prior to the application of emission factors. National-level usage by SCC was computed as follows:

SCC 2104008001 = 2,475,565 tons;
SCC 2104008002 = 7,881,526 tons;
SCC 2104008003 = 488,312 tons;
SCC 2104008004 = 197,038 tons;
SCC 2104008010 = 9,176,066 tons;
SCC 2104008030 = 229,402 tons; and
SCC 2104008050 = 568,517 tons

Emission Factors

The majority of the emission factors used to determine national emission estimates for RWC were obtained from EPA's AP-42 document (Tables 1.9-1, 1.10-3, and 1.10-4). [8] Some of the stove and insert factors were adjusted based on new data developed in the reference *Review of Wood Heater and Fireplace Emission Factors.*[9] The emission factors generated by Houck, et. al.[9] for 7-PAH and 16-PAH were approximately 62% lower than associated AP-42 emission factors. All of the AP-42 PAH emission factors were thus adjusted downward by 62%. The dioxin and furan emission factors were retrieved from an EPA report[10]. Tables 4-10 summarize the emission factors and emissions used for the HAP and criteria pollutants.

Seasonal Throughput Data

Default seasonal throughput values prepared during development of the RWC methodology are listed as follows by National Climate Data Center climate zone:

Climate Zone	Winter	Spring	Summer	Fall
5	100	0	0	0
4	70	15	0	15
3	50	25	0	25
2	40	30	0	30
1	33.33	33.33	0	33.33

These seasonal throughput percentage values were included in the Emission Process table of the inventory. The climate zone to which each state and county was assigned is available in the Appendix B table [of EPA's Preliminary NEI documentation for HAPs] containing the year 2000 detached single-family housing data.

Table G-4: Emission Factors and National-Level Emissions for SCC 2104008001

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	3.71E-07
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	3.91E-07
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	2.90E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	4.41E-07
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	3.09E-07
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	2.72E-07
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	3.09E-07
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	2.46E-07
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	3.09E-07
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	5.64E-07
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	3.19E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	9.25E-08	mg/kg	9	2.04E-07
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	7.97E-07
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	1.55E-06
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	2.82E-07
Carbon Monoxide	6.41E+01	lb/ton	7	7.93E+04
Nitrogen Oxides	2.60E+00	lb/ton	7	3.22E+03
Octachlorodibenzofuran	8.33E-08	mg/kg	9	2.06E-07
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	8.24E-07
Primary PM_{10},total	1.18E+01	lb/ton	7	1.46E+04
Primary $PM_{2.5}$, total	1.18E+01	lb/ton	7	1.46E+04
Sulfur Dioxide	4.00E-01	lb/ton	7	4.95E+02
Volatile Organic Compounds	2.29E+02	lb/ton	7	2.83E+05

Table G-5: Emission Factors and National-Level Emissions for SCC 2104008002

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	1.18E-06
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	1.25E-06
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	9.22E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	1.40E-06
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	9.85E-07
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	8.67E-07
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	9.85E-07
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	7.82E-07
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	9.85E-07
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	1.80E-06
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	1.02E-06
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	6.50E-07
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	2.54E-06
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	4.93E-06
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	8.98E-07
Acenaphthene	6.21E-03	lb/ton	7,8	2.45E+01
Acenaphthylene	1.32E-01	lb/ton	7,8	5.20E+02
Anthracene	8.69E-03	lb/ton	7,8	3.42E+01
Benz(a)anthracene	1.24E-02	lb/ton	7,8	4.89E+01
Benzene	1.94E+00	lb/ton	7	7.64E+03
Benzo(a)pyrene	2.48E-03	lb/ton	7,8	9.77E+00
Benzo(b)fluoranthene	3.73E-03	lb/ton	7,8	1.47E+01
Benzo(e)pyrene	7.45E-03	lb/ton	7,8	2.94E+01
Benzo(g,h,i)perylene	2.48E-03	lb/ton	7,8	9.77E+00
Benzo(k)fluoranthene	1.24E-03	lb/ton	7,8	4.89E+00
Cadmium	2.20E-05	lb/ton	7	8.67E-02
Carbon Monoxide	2.31E+02	lb/ton	7	9.10E+05
Chrysene	7.45E-03	lb/ton	7,8	2.94E+01
Fluoranthene	1.24E-02	lb/ton	7,8	4.89E+01
Fluorene	1.49E-02	lb/ton	7,8	5.87E+01
Manganese	1.70E-04	lb/ton	7	6.70E-01
Methyl Ethyl Ketone	2.90E-01	lb/ton	7	1.14E+03
Naphthalene	1.79E-01	lb/ton	7,8	7.05E+02
Nickel	1.40E-05	lb/ton	7	5.52E-02
Nitrogen Oxides	2.80E+00	lb/ton	7	1.10E+04
Octachlorodibenzofuran	8.33E-08	mg/kg	9	6.56E-07
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	2.62E-06
O-xylene	2.02E-01	lb/ton	7	7.96E+02
Phenanthrene	4.84E-02	lb/ton	7,8	1.91E+02
Primary PM_{10} ,total	3.06E+01	lb/ton	7	1.21E+05
Primary $PM_{2.5}$, total	3.06E+01	lb/ton	7	1.21E+05
Pyrene	1.49E-02	lb/ton	7,8	5.87E+01
Sulfur Dioxide	4.00E-01	lb/ton	7	1.58E+03
Toluene	7.30E-01	lb/ton	7	2.88E+03
Volatile Organic Compounds	5.30E+01	lb/ton	7	2.09E+05

Table G-6: Emission Factors and National-Level Emissions for SCC 2104008003

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	7.32E-08
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	7.71E-08
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	5.71E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	8.69E-08
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	6.10E-08
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	5.37E-08
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	6.10E-08
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	4.84E-08
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	6.10E-08
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	1.11E-07
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	6.30E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	4.03E-08
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	1.57E-07
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	3.05E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	5.57E-08
7,12-Dimethyl/benz(a)anthracene	1.62E-03	lb/ton	7,8	3.96E-01
Acenaphthene	4.04E-03	lb/ton	7,8	9.86E-01
Acenaphthylene	1.29E-02	lb/ton	7,8	3.15E+00
Anthracene	3.64E-03	lb/ton	7,8	8.89E-01
Benzo(a)pyrene	2.42E-03	lb/ton	7,8	5.91E-01
Benzo(b)fluoranthene	1.62E-03	lb/ton	7,8	3.96E-01
Benzo(e)pyrene	8.08E-04	lb/ton	7,8	1.97E-01
Benzo(g,h,i)Fluoranthene	1.13E-02	lb/ton	7,8	2.76E+00
Benzo(g,h,i)perylene	8.08E-03	lb/ton	7,8	1.97E+00
Biphenyl	8.89E-03	lb/ton	7	2.17E+00
Cadmium	2.00E-05	lb/ton	7	4.88E-03
Carbon Monoxide	1.41E+02	lb/ton	7	3.44E+04
Chrysene	4.04E-03	lb/ton	7,8	9.86E-01
Dibenzo(a,h)anthracene	1.62E-03	lb/ton	7,8	3.96E-01
Fluoranthene	3.23E-03	lb/ton	7,8	7.89E-01
Fluorene	5.66E-03	lb/ton	7,8	1.38E+00
Indeno(1,2,3-cd)pyrene	8.08E-03	lb/ton	7,8	1.97E+00
Manganese	1.40E-04	lb/ton	7	3.42E-02
Naphthalene	5.82E-02	lb/ton	7,8	1.42E+01
Nickel	2.00E-05	lb/ton	7	4.88E-03
Octachlorodibenzofuran	8.33E-08	mg/kg	9	4.07E-08
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	1.63E-07
Perylene	8.08E-04	lb/ton	7,8	1.97E-01
Phenanthrene	4.77E-02	lb/ton	7,8	1.16E+01
PRIMARY PM_{10}, total	1.96E+01	lb/ton	7	4.79E+03
PRIMARY $PM_{2.5}$, total	1.96E+01	lb/ton	7	4.79E+03
Pyrene	3.23E-03	lb/ton	7,8	7.89E-01
Sulfur Dioxide	4.00E-01	lb/ton	7	9.77E+01
Volatile Organic Compounds	1.20E+01	lb/ton	7	2.93E+03

Table G-7: Emission Factors and National-Level Emissions for SCC 2104008004

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	2.96E-08
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	3.11E-08
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	2.30E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	3.51E-08
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.46E-08
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	2.17E-08
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.46E-08
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	1.95E-08
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.46E-08
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	4.49E-08
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	2.54E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	1.63E-08
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	6.34E-08
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	1.23E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	2.25E-08
Acenaphthene	3.08E-03	lb/ton	7,8	3.03E-01
Acenaphthylene	3.49E-02	lb/ton	7,8	3.44E+00
Anthracene	4.10E-03	lb/ton	7,8	4.04E-01
Benz(a)anthracene	1.23E-02	lb/ton	7,8	1.21E+00
Benzene	1.46E+00	lb/ton	7	1.44E+02
Benzo(a)pyrene	2.05E-03	lb/ton	7,8	2.02E-01
Benzo(b)fluoranthene	2.05E-03	lb/ton	7,8	2.02E-01
Benzo(e)pyrene	2.05E-03	lb/ton	7,8	2.02E-01
Benzo(g,h,i)Fluoranthene	3.08E-03	lb/ton	7,8	3.03E-01
Benzo(g,h,i)perylene	1.03E-03	lb/ton	7,8	1.01E-01
Benzo(k)fluoranthene	1.03E-03	lb/ton	7,8	1.01E-01
Carbon Monoxide	1.04E+02	lb/ton	7	1.03E+04
Chrysene	5.13E-03	lb/ton	7,8	5.05E-01
Dibenzo(a,h)anthracene	1.03E-03	lb/ton	7,8	1.01E-01
Fluoranthene	6.16E-03	lb/ton	7,8	6.07E-01
Fluorene	7.18E-03	lb/ton	7,8	7.07E-01
Indeno(1,2,3-cd)pyrene	2.05E-03	lb/ton	7,8	2.02E-01
Methyl Ethyl Ketone	6.20E-02	lb/ton	7	6.11E+00
Naphthalene	9.54E-02	lb/ton	7,8	9.40E+00
Nitrogen Oxides	2.00E+00	lb/ton	7	1.97E+02
Octachlorodibenzofuran	8.33E-08	mg/kg	9	1.64E-08
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	6.56E-08
O-xylene	1.86E-01	lb/ton	7	1.83E+01
Phenanthrene	2.46E-02	lb/ton	7,8	2.42E+00
PRIMARY PM $_{10}$, total	2.04E+01	lb/ton	7	2.01E+03
PRIMARY PM $_{2.5}$, total	2.04E+01	lb/ton	7	2.01E+03
Pyrene	5.13E-03	lb/ton	7,8	5.05E-01
Sulfur Dioxide	4.00E-01	lb/ton	7	3.94E+01
Toluene	5.20E-01	lb/ton	7	5.12E+01
Volatile Organic Compounds	1.50E+01	lb/ton	7	1.48E+03

Table G-8: Emission Factors and National-Level Emissions for SCC 2104008010

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	1.38E-06
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	1.45E-06
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	1.07E-06
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	1.63E-06
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	1.15E-06
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	1.01E-06
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	1.15E-06
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	9.10E-07
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	1.15E-06
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	2.09E-06
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	1.18E-06
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	7.57E-07
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	2.95E-06
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	5.73E-06
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	1.05E-06
Acenaphthene	6.21E-03	lb/ton	7,8	2.85E+01
Acenaphthylene	1.32E-01	lb/ton	7,8	6.06E+02
Anthracene	8.69E-03	lb/ton	7,8	3.99E+01
Benz(a)anthracene	1.24E-02	lb/ton	7,8	5.69E+01
Benzene	1.94E+00	lb/ton	7	8.89E+03
Benzo(a)pyrene	2.48E-03	lb/ton	7,8	1.14E+01
Benzo(b)fluoranthene	3.73E-03	lb/ton	7,8	1.71E+01
Benzo(e)pyrene	7.45E-03	lb/ton	7,8	3.42E+01
Benzo(g,h,i)perylene	2.48E-03	lb/ton	7,8	1.14E+01
Benzo(k)fluoranthene	1.24E-03	lb/ton	7,8	5.69E+00
Cadmium	2.20E-05	lb/ton	7	1.01E-01
Carbon Monoxide	2.31E+02	lb/ton	7	1.06E+06
Chrysene	7.45E-03	lb/ton	7,8	3.42E+01
Fluoranthene	1.24E-02	lb/ton	7,8	5.69E+01
Fluorene	1.49E-02	lb/ton	7,8	6.84E+01
Manganese	1.70E-04	lb/ton	7	7.80E-01
Methyl Ethyl Ketone	2.90E-01	lb/ton	7	1.33E+03
Naphthalene	1.79E-01	lb/ton	7,8	8.21E+02
Nickel	1.40E-05	lb/ton	7	6.42E-02
Nitrogen Oxides	2.80E+00	lb/ton	7	1.28E+04
Octachlorodibenzofuran	8.33E-08	mg/kg	9	7.64E-07
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	3.06E-06
O-xylene	2.02E-01	lb/ton	7	9.27E+02
Phenanthrene	4.84E-02	lb/ton	7,8	2.22E+02
PRIMARY PM_{10}, Total	3.06E+01	lb/ton	7	1.40E+05
PRIMARY $PM_{2.5}$, Total	3.06E+01	lb/ton	7	1.40E+05
Pyrene	1.49E-02	lb/ton	7,8	6.84E+01
Sulfur Dioxide	4.00E-01	lb/ton	7	1.84E+03
Toluene	7.30E-01	lb/ton	7	3.35E+03
Volatile Organic Compounds	5.30E+01	lb/ton	7	2.43E+05

Table G-9: Emission Factors and National-Level Emissions for SCC 2104008030

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	3.44E-08
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	3.62E-08
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	2.68E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	4.08E-08
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.87E-08
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	2.52E-08
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.87E-08
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	2.28E-08
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	2.87E-08
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	5.23E-08
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	2.96E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	1.89E-08
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	7.39E-08
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	1.43E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	2.61E-08
Acenaphthene	3.08E-03	lb/ton	7,8	3.53E-01
Acenaphthylene	3.49E-02	lb/ton	7,8	4.00E+00
Anthracene	4.10E-03	lb/ton	7,8	4.70E-01
Benz(a)anthracene	1.23E-02	lb/ton	7,8	1.41E+00
Benzene	1.46E+00	lb/ton	7	1.68E+02
Benzo(a)pyrene	2.05E-03	lb/ton	7,8	2.35E-01
Benzo(b)fluoranthene	2.05E-03	lb/ton	7,8	2.35E-01
Benzo(e)pyrene	2.05E-03	lb/ton	7,8	2.35E-01
Benzo(g,h,i)Fluoranthene	3.08E-03	lb/ton	7,8	3.53E-01
Benzo(g,h,i)perylene	1.03E-03	lb/ton	7,8	1.18E-01
Benzo(k)fluoranthene	1.03E-03	lb/ton	7,8	1.18E-01
Carbon Monoxide	1.04E+02	lb/ton	7	1.20E+04
Chrysene	5.13E-03	lb/ton	7,8	5.88E-01
Dibenzo(a,h)anthracene	1.03E-03	lb/ton	7,8	1.18E-01
Fluoranthene	6.16E-03	lb/ton	7,8	7.07E-01
Fluorene	7.18E-03	lb/ton	7,8	8.24E-01
Indeno(1,2,3-cd)pyrene	2.05E-03	lb/ton	7,8	2.35E-01
Methyl Ethyl Ketone	6.20E-02	lb/ton	7	7.11E+00
Naphthalene	9.54E-02	lb/ton	7,8	1.09E+01
Nitrogen Oxides	2.00E+00	lb/ton	7	2.29E+02
Octachlorodibenzofuran	8.33E-08	mg/kg	9	1.91E-08
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	7.64E-08
O-xylene	1.86E-01	lb/ton	7	2.13E+01
Phenanthrene	2.46E-02	lb/ton	7,8	2.82E+00
PRIMARY PM_{10}, Total	2.04E+01	lb/ton	7	2.34E+03
PRIMARY $PM_{2.5}$, Total	2.04E+01	lb/ton	7	2.34E+03
Pyrene	5.13E-03	lb/ton	7,8	5.88E-01
Sulfur Dioxide	4.00E-01	lb/ton	7	4.59E+01
Toluene	5.20E-01	lb/ton	7	5.96E+01
Volatile Organic Compounds	1.50E+01	lb/ton	7	1.72E+03

Table G-10: Emission Factors and National-Level Emissions for SCC 2104008050

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Reference	Emissions (tons/year)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-07	mg/kg	9	8.53E-08
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1.58E-07	mg/kg	9	8.98E-08
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.17E-07	mg/kg	9	6.65E-08
1,2,3,4,7,8-Hexachlorodibenzofuran	1.78E-07	mg/kg	9	1.01E-07
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	7.11E-08
1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	mg/kg	9	6.25E-08
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	7.11E-08
1,2,3,7,8,9-Hexachlorodibenzofuran	9.92E-08	mg/kg	9	5.64E-08
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1.25E-07	mg/kg	9	7.11E-08
1,2,3,7,8-Pentachlorodibenzofuran	2.28E-07	mg/kg	9	1.30E-07
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.29E-07	mg/kg	9	7.33E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	8.25E-08	mg/kg	9	4.69E-08
2,3,4,7,8-Pentachlorodibenzofuran	3.22E-07	mg/kg	9	1.83E-07
2,3,7,8-Tetrachlorodibenzofuran	6.25E-07	mg/kg	9	3.55E-07
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-07	mg/kg	9	6.48E-08
7,12-Dimethyl/benz(a)anthracene	1.62E-03	lb/ton	7,8	4.60E-01
Acenaphthene	4.04E-03	lb/ton	7,8	1.15E+00
Acenaphthylene	1.29E-02	lb/ton	7,8	3.67E+00
Anthracene	3.64E-03	lb/ton	7,8	1.03E+00
Benzo(a)pyrene	2.42E-03	lb/ton	7,8	6.88E-01
Benzo(b)fluoranthene	1.62E-03	lb/ton	7,8	4.60E-01
Benzo(e)pyrene	8.08E-04	lb/ton	7,8	2.30E-01
Benzo(g,h,i)Fluoranthene	1.13E-02	lb/ton	7,8	3.21E+01
Benzo(g,h,i)perylene	8.08E-03	lb/ton	7,8	2.30E+00
Biphenyl	8.89E-03	lb/ton	7	2.53E+00
Cadmium	2.00E-05	lb/ton	7	5.69E-03
Carbon Monoxide	1.41E+02	lb/ton	7	4.00E+04
Chrysene	4.04E-03	lb/ton	7,8	1.15E+00
Dibenzo(a,h)anthracene	1.62E-03	lb/ton	7,8	4.60E-01
Fluoranthene	3.23E-03	lb/ton	7,8	9.18E-01
Fluorene	5.66E-03	lb/ton	7,8	1.61E+00
Indeno(1,2,3-cd)pyrene	8.08E-03	lb/ton	7,8	2.30E+00
Manganese	1.40E-04	lb/ton	7	3.98E-02
Naphthalene	5.82E-02	lb/ton	7,8	1.65E+01
Nickel	2.00E-05	lb/ton	7	5.69E-03
Octachlorodibenzofuran	8.33E-08	mg/kg	9	4.73E-08
Octachlorodibenzo-p-dioxin	3.33E-07	mg/kg	9	1.89E-07
Perylene	8.08E-04	lb/ton	7,8	2.30E-01
Phenanthrene	4.77E-02	lb/ton	7,8	1.36E+01
PRIMARY PM_{10}, Total	1.96E+01	lb/ton	7	5.57E+03
PRIMARY $PM_{2.5}$, Total	1.96E+01	lb/ton	7	5.57E+03
Pyrene	3.23E-03	lb/ton	7,8	9.18E-01
Sulfur Dioxide	4.00E-01	lb/ton	7	1.14E+02
Volatile Organic Compounds	1.20E+01	lb/ton	7	3.41E+03

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Appendix H: U.S. EPA Region I Comments on Maine's preliminary draft 2002 Emissions Inventory: Letter from R. McConnell, Tuesday, January 25, 2005

1. EPA Comment: Maine-DEP collected NOx and VOC air emissions data for 2002 from point sources in the state, and has reported this information electronically to the EPA's national emissions inventory (NEI) database. The draft inventory documentation report contains a table listing these 2002 emission estimates. Table H-1 below shows a number of point sources whose 2002 NOx emission estimates deviate significantly from their 1999 emission estimate; Table H-2 shows similar information for VOCs. Additionally, Spinnaker Paper Mill (23005-00195) emitted 215 tpy VOC in 1999, but was not part of the 2002 data set. ME-DEP should confirm the accuracy of these facility's 2002 emissions.

Maine DEP Response: Maine DEP reviewed the data in Tables H-1 and H-2, and provided the comment field to indicate the reason for the large percent differences.

Table H-1:Point sources with large percent changes in NOx, 1999 to 2002

Facility Id	Facility Name	2002 NOX	1999 NOx	% Change	Maine DEP Comments
2300700021	INTERNATIONAL PAPER - ANDROSCOGGIN	1,275	2,248	76%	Significant decrease in boiler throughput.
2300900004	INTERNATIONAL PAPER - BUCKSPORT	463	1,867	303%	Significant decrease in boiler throughput.
2301900034	GEORGIA-PACIFIC CORPORATION -	424	618	46%	Emission Factor for Black Liquor in 002 Recovery Boiler changed from 3.1 to 1.253.
2300100024	MID MAINE WASTE ACTION CORPORATION	383	130	-66%	Emission Factor for Municipal Solid Waste changed from 3.6 to 11.96.
2301900055	WHEELABRATOR-SHERMAN ENERGY CO	190	5	-97%	Error in 1999 % control-Actual NOx=190.
2301900086	INDECK WEST ENFIELD ENERGY CENTER	137	6	-96%	Significant increase (3000%) in wood boiler throughput.
2300300072	BORALEX ASHLAND	137	255	87%	Significant decrease in wood boiler throughput.
2300300032	MCCAIN FOODS USA INC - EASTON	136	63	-54%	Significant increase (149%) in boiler #3. New boiler added in 2000.
2300300062	LOUISIANA-PACIFIC CORP - NEW LIMERICK	120	65	-46%	Switched to more specific SCC and increased throughput.

Table H-2: Point sources with large percent changes in VOC, 1999 to 2002

Facility Id	Facility Name	2002 VOC	1999 VOC	% Change	Maine DEP Comments
2300700021	INTERNATIONAL PAPER - ANDROSCOGGIN	370.6	531.0	43%	Significant decrease in boiler throughput and coating & additive produced from 1999 to 2002.
2300900004	INTERNATIONAL PAPER - BUCKSPORT	353.6	185.0	-48%	Three processes added after 1999 NEI was submitted to EPA. VOC=475.5.
2301300009	FMC BIOPOLYMER	280.6	112.0	-60%	Emission Factor for Misc VOC changed from 6.7X10-4 to 1.5X10-5 and increased throughput.
2300300070	J PAUL LEVESQUE & SONS INC - ASHLAND	110.1	12.0	-89%	Addition of Kilns to Emission Reporting.
2301700045	MEADWESTVACO OXFORD CORP	101.5	281.0	177%	Replacement of 3 brownstock washers with a collected DD washer.
2300300050	J PAUL LEVESQUE & SONS INC - MASARDIS	80.8	20.0	-75%	Addition of Kilns to Emission Reporting.
2301700046	IRVING FOREST PRODUCTS - DIXFIELD	77.7	2.0	-97%	Addition of Kilns to Emission Reporting.
2303100078	MAINE ENERGY RECOVERY COMPANY	51.8	1.4	-97%	Emission Factor for RDF changed from 0.014 to 0.5.
2302100014	GREENVILLE STEAM CO	3.8	107.0	2710%	Emission Factor for wood changed from 1.4 to 0.044.

Facility Id	Facility Name	2002 VOC	1999 VOC	% Change	Maine DEP Comments
2302500028	BORALEX ATHENS ENERGY	3.0	71.4	2259%	Emission Factor for wood changed from 0.1 to 0.068.
2300300051	* BORALEX FORT FAIRFIELD	2.8	188.0	6626%	Emission Factor for wood changed from 1.4 to 0.017.
	* in 1999, named Aroostook Valley Electric				

2. EPA Comment: ME-DEP may want to clarify the PM reporting requirements in Tables showing criteria pollutant emission reporting thresholds, such as Table 2 on page 16, to more clearly indicate that reporting of both PM2.5 and PM10 is required, and that both levels are 15 tpy.

Maine DEP Response: The thresholds specified were in effect for the 2002 inventory submission period. Revisions to 06-096 Chapter 137, “Emission Statements”, which specified the PM species and established the 15 tpy minimum reporting thresholds were not in effect until after facilities were required to file their emission statements.

3. EPA Comment: Maine DEP used a fuel based methodology to estimate the combustion related emissions from commercial marine vessels. As mentioned on page 35 of the draft inventory, a better means for quantifying emissions from these vessels exists. EPA encourages ME-DEP to make improving the emission estimate for this source category a high priority, particularly given the large and growing size of the port of Portland.

Maine DEP Response: Maine DEP recognizes that the methodology has been updated and has reviewed the documents, “Commercial Marine Emission Inventory Development, Final Report” (U.S. EPA, July 2002) and “Commercial Marine Activity for Deep Sea Ports in the United States, Final Report” (U.S. EPA, September 1999). The methodology described in those documents is labor intensive and time-consuming, and given staff turnover in the program, Maine DEP did not have an opportunity to use that methodology for 2002 NEI development. Instead, we used the existing methodology from which 1999 estimates had been calculated. However, Maine DEP does recognize the value of the new methodology and will be utilizing for the 2005 NEI.

4. EPA Comment: Given the sizable emissions from commercial marine vessels, locomotives, and aircraft, ME-DEP should represent emissions from these 3 source categories individually rather than lumping the emissions together as is done in the spreadsheet labeled “1-15%VOC-PA1(2005-4).xls” sent via e-mail to EPA on January 11, 2005.

Maine DEP Response: Individual calculations for these source categories were provided to EPA and the public prior to posting these SIP amendments and included in the May, 2005 NEI amendments. These calculations can be found on http://www.epa.gov/ttn/chief/net/announcement_2002draft.pdf.

5. EPA Comment: On page 36, ME-DEP indicates that the fuel used by a rail line owned by a Canadian firm was added to the State’s total for diesel fuel use by locomotive engines which was obtained from the U.S. Dept. of Energy. You might want to re-consider how these emissions were allocated geographically, and consider allocating them to only those counties that this line runs though. The rationale for not doing so found on page 36 was not clear.

Maine DEP Response: Although allocating fuel usage to the track miles utilized by the rail company is ideal, the fuel use data used to determine this is still incomplete. Using this methodology would have resulted in over half the emissions for the state being allocated to Washington county. This would be incorrect based on our knowledge of population centers and on the location of major industries that use rail extensively. To correct for this, the total amount of fuel used by locomotives state wide was allocated based on track miles per county. The Department was unable to make changes to this SIP amendment submittal, but will be improving the methodology for the 2005 NEI submittal.

6. EPA Comment: (a) Collecting fuel consumption data from the rail companies operating in the State, as was attempted, will provide a significant improvement to Maine's emission estimate for this source category. Maine should review it's authority for collection of such data, and actively pursue collecting this data from the rail lines that did not respond to the state's initial request. (b) Additionally, as ME-DEP notes, emissions from switch-yard locomotives should be included in the inventory.

Maine DEP Response: (a) Maine DEP agrees and plans to initiate a change 06-096 CMR Chapter 137 to provide Maine DEP with the Authority to collect this data in the future. (b) The rail companies surveyed indicated that they not have dedicated yard engines. They use line locomotives as yard locomotives as needed. Maine DEP intends on continuing to build a rapport with this industry to obtain better numbers for this aspect of the inventory, as well as a better understanding of the track miles used by each rail line.

7. EPA Comment: The VOC emission estimate for 2005 for forest & wildfires is an order of magnitude higher than estimates for the other years. ME-DEP should review the emission calculations for this source category.

Maine DEP Response: Maine DEP has reviewed its calculations and apparently this error was corrected prior to the amendments being posted for public comment.

8. EPA Comment: On page 68, ME-DEP indicates that since their point source reporting thresholds are low, it is unlikely that there are significant industrial fuel combustion emissions from area sources. ME-DEP should attempt to confirm this, as other states in New England have found that area source emissions from this sector are not inconsequential. For example, the Massachusetts DEP's 1999 emissions inventory found that by using gross fuel consumption data from the Energy Information Agency, then subtracting fuel consumed by the point sources tracked by the state, area source industrial fuel emissions were 1.24 tpsd VOC, and 21.1 tpsd NOx. The Massachusetts DEP's point source inventory cut-off for 1999 was 1 tpy.

Maine DEP Response: Table H-3 compares the 2000 i-Steps data with the 2000 DOE fuel data for industrial sources in 2000.

Table H-3.

	DOE estimates			i-Steps Amount		
Substance burned	**Commercial**	**Industrial**	**Electric Generation**	**Commercial**	**Industrial**	**Electric Generation**
DISTILLATE OIL (1000 Gallons)	135,366	40,698	1,722	6,149	15,710	1,074
NATURAL GAS (Million Cu. Ft.)	3,000	13,000	27,000	18,253	4,657	22,846
PROPANE (1000 Gallons)	7,770			1,930		
RESIDUAL OILS (1000 Gallons)	10,626	924	135,870	55,612	181,127	125,468
WOOD & WASTE (tons)	197,694	6,180,233	1,540,698	1,181,704	3,365,843	2,024,911
COAL (tons)		219,000		495,631		
PROPANE (1000 Gallons)	7,770	3,738		1,930	7,014	14
* add BITUMINOUS COAL and LIGNITE to COAL						
* add RESIDUAL OIL, KEROSENE, JP-8, LIQUID WASTE and WASTE OIL to RESIDUAL OILS						
* add WOOD WASTE. RDF, SLUDGE, SOLID WASTE, and TDF to WOOD & WASTE						

Table H-4.

Substance burned	DOE TOTAL	ISTEPS TOTAL
DISTILLATE OIL	177,786	22,934
NATURAL GAS	43,000	45,756
RESIDUAL OILS	147,420	362,207
WOOD & WASTE	7,918,625	6,572,458
COAL	219,000	495,631
PROPANE	11,508	8,957

As can be seen in Table H-4, the i-STEPS-calculated fuel use values for COAL, NATURAL GAS, and RESIDUAL OILS are larger that the values obtained from DOE. Therefore, subtracting the i-STEPS value from the DOE value yields a negative number. Rather than calculating VOC and NOx numbers based on negative fuel usage, the industrial fuel use for area sources was assumed to be zero, and not included in the 15% plan of the 5% ROP plan. The only categories which had a high amount of DOE fuel than i-Steps is DISTILLATE OIL and PROPANE. The Emission Factor for PROPANE is negligible, and was therefore discounted. DOE estimated that 177,786 thousand gallons of DISTILLATE OIL were burned compared to i-Steps value of 22,934. The Maine DEP is able to conduct site inspections and therefore verify the i-Steps data thus the i-Steps data is verifiable, and the DOE data is not. The Maine DEP believes that it is inappropriate to calculate additional emission based on the inaccuracies found in the DOE data. For example, the DOE underestimates the amount of COAL and RESIDUAL OILS by a factor of 2, thus leading us to conclude that some of the RESIDUAL OIL reported to DOE was miscoded as DISTILLATE OIL and should thereby zero out that category also.

9. EPA Comment: EPA agrees with ME-DEP's statement on page 93 that emissions from residential wood combustion are substantial, and merit a better inventory technique than the method currently used which was based on a regional survey conducted by MANE-VU. We encourage ME-DEP to explore the possibility of conducting a state-wide survey to determine residential wood combustion activity levels.

Maine DEP Response: Maine DEP has initiated this project and hopes to have better emission estimates for the 2005 NEI.

10. EPA Comment: The stage 1 calculations shown on page 103 are incorrect. Based on the throughput data shown, the calculation should be performed as follows for Cumberland county:

<u>Data inputs:</u>

EF for vapor balance tanks = 0.3 lbs. VOC/1,000 gal.
EF for submerged fill tanks = 7.3 lbs. VOC/1,000 gal.
EF for uncontrolled tanks = 11.5 lbs. VOC/1,000 gal.
Control efficiency of vapor balance tanks = (11.5 – 0.3)/11.5 = 97.4%
Rule effectiveness = 80%
Ozone season (April thru Sept. 15th) VB t-put = 92,962 thousand gal.
Ozone season (April thru Sept. 15th) Submerged t-put = 4,893 thousand gal.

<u>Vapor balance tank emissions</u>

(92,962 Thou. gal.) * (11.5 lbs. VOC/1000 gal.)(1-(0.974)(0.8)) =
236,050 lbs VOC per ozone season. Converting this to tons, and assuming this activity occurs 6 days per week during the 165 day ozone season, yields 0.83 tpsd.

<u>Submerged fill tank emissions</u>

(4,893 thou. gal) * 7.3 lbs. VOC/1,000 gal. = 35,717 lbs VOC per ozone season. Converting this to tons, and assuming this activity occurs 6 days per week during the 165 day ozone season, yields 0.13 tpsd.

Therefore, total stage 1 emissions for Cumberland county are 0.83 + 0.13 = 0.96 tpsd.

Maine DEP Response: Maine DEP did make an error during the calculation of the Stage 1 refueling emissions. The correct example calculation for ozone season VOC emissions in Cumberland County is below.

Data Inputs

EF for vapor balance tanks = 0.3 lbs. VOC/1000 gal
EF for submerged fill tanks = 7.3 lbs. VOC/1000 gal
EF for uncontrolled tanks = 11.5 lbs. VOC/1000 gal
Control efficiency of vapor balance tanks = (11.5-0.3)/11.5 = 97.4%
Rule Effectiveness = 80%

2002 Ozone season –weighted (April 1 thru Sept 15) Daily statewide gasoline throughput
= 2,297.86-1000 gal
2002 Summer season statewide Average Daily Vehicle Miles Traveled (ADVMT)
= 49,093,092 miles
2002 Summer season Cumberland County ADVMT = 10,173,666 miles (20.72%)

Based on conversations with our UST Program, Maine assumes that 95% of all gasoline passes through vapor balanced tanks

2002 Ozone season daily, vapor balanced throughput for Cumberland County
= (2,297.86-1000 gal) * 20.72% * 0.95 = 452.38-1000 gal
2002 Ozone season daily, submerged fill throughput for Cumberland County
= (2,297.86-1000 gal) * 20.72% * 0.05 = 23.81-1000 gal

Vapor Balance Tank Emissions

(452.38-1000 gal) * (11.5 lbs. VOC/1000 gal) * (1-(0.974)(0.8)) / 2000 = 0.574 tpsd VOC

Submerged Fill Tank Emissions

(23.81-1000 gal) * (7.3 lbs. VOC/gal) / 2000 = 0.087 tpsd VOC

Total Stage 1 Emissions

Total Stage 1 Emissions = Vapor Balance Tank Emissions + Submerged Fill Tank
= 0.574 + 0.087 = 0.661 tpsd VOC in Cumberland County

Maine DEP also discovered that a similar error had been made in 1990 baseline calculations. All revised Stage 1 calculations can be found on the ftp:// site in the file named “ StageI_TGrev_0305.xls”.

Appendix I: Nonpoint Source Categories with Data Sources, final, May 2005

RED Background = Records deleted; RED Text = Records added

SCC	SCC_L2	SCC_L3	SCC_L4	Primary Contact	E-00-X	E-01-X	E-02-X	E-98-F	E-98-G	E-99-F	E-99-F-PR	M-91-F	M-93-F	M-96-F	M-98-F	M-99-F	P-02-X	S-02-X	S-02-X-PR	S-99-F	COMMENTS
10200501	Industrial	Distillate Oil	Grades 1 and 2 Oil	RTG												133				195	NEED TO BACK OUT POINT SOURCE DATA
10200901	Industrial	Wood/Bark Waste	Bark-fired Boiler	RTG																52	VERIFIED BY RTG
10201302	Industrial	Liquid Waste	Waste Oil	RTG										133				201		195	NEED TO BACK OUT POINT SOURCE DATA
10300701	Commercial/Institutional	Process Gas	POTW Digester Gas-fired Boiler	TLG										19						60	ZERO ACTIVITY DATA; DELETED OLD DATA CARRIED FORWARD
2102004000	Industrial	Distillate Oil	Total: Boilers and IC Engines	RTG		848															see Justification to remove 2102004000.doc
2102006000	Industrial	Natural Gas	Total: Boilers and IC Engines	RTG		304															see Industrial combustion of NG and Kerosene.doc
2102011000	Industrial	Kerosene	Total: All Boiler Types	RTG		848															VERIFIED BY RTG
2103001000	Commercial/Institutional	Anthracite Coal	Total: All Boiler Types	RTG		352															
2103004000	Commercial/Institutional	Distillate Oil	Total: Boilers and IC Engines	RTG		848															
2103007000	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Total: All Combustor Types	RTG		304															
2103008000	Commercial/Institutional	Wood	Total: All Boiler Types	RTG												14		480		48	ADDITIONAL HAPS DATA
2103011000	Commercial/Institutional	Kerosene	Total: All Combustor Types	RTG		848															VERIFIED BY RTG
2104001000	Residential	Anthracite Coal	Total: All Combustor Types	RTG			870														NO DATA FROM PS CY (021) - EPA says no coal was burned in 021 - keep EPA data
2104004000	Residential	Distillate Oil	Total: All Combustor Types	RTG			720														
2104006000	Residential	Natural Gas	Total: All Combustor Types	RTG			272														
2104007000	Residential	Liquified Petroleum Gas (LPG)	Total: All Combustor Types	RTG	272																
2104008000	Residential	Wood	Total: Woodstoves and Fireplaces	RTG													2128				NEED TO REVIEW PECHAN WORK Not Entirely comfortable
2104011000	Residential	Kerosene	Total: All Heater Types	RTG	720																
2294000000	Paved Roads	All Paved Roads	Total: Fugitives	TLG													64	64			CALCULATIONS DONE AFTER JUNE 04
2296000000	Unpaved Roads	All Unpaved Roads	Total: Fugitives	TLG													64	64			CALCULATIONS DONE AFTER JUNE 04
2301030000	Chemical Manufacturing: SIC 28	Process Emissions from Pharmaceutical Manuf (NAPAP cat. 106)	Total	lph			13														verified by Dave & Lisa
2302002100	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Conveyorized Charbroiling	TLG														544			
2302002200	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Under-fired Charbroiling	TLG			16											544			EPA ADDED MISSING EMISSIONS FOR O-XYLENE
2302003000	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Deep Fat Fying	TLG														16			

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SCC	SCC_L2	SCC_L3	SCC_L4	Primary Contact	E-00-X	E-01-X	E-02-X	E-98-F	E-98-G	E-99-F	E-99-F-PR	M-91-F	M-93-F	M-96-F	M-98-F	M-99-F	P-02-X	S-02-X	S-02-X-PR	S-99-F	COMMENTS
2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2302003200	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Clamshell Griddle Frying	TLG														48			
2302080002	Food and Kindred Products: SIC 20	Miscellaneous Food and Kindred Products	Refrigeration	lph														32			
2303000000	Primary Metal Production: SIC 33	All Processes	Total	lph								4									INCLUDED IN HAP PT SOURCES; CATEGORY DELETED
2305000000	Mineral Processes: SIC 32	All Processes	Total	LPH														128			ZERO ACTIVITY DATA; Refractory materials manufacturing. None Manufactured in Maine. Zeroes entered
2305070000	Mineral Processes: SIC 32	Concrete, Gypsum, Plaster Products	Total	LPH										25							OLD MACT CATEGORY; DELETING
2309100010	Fabricated Metals: SIC 34	Coating, Engraving, and Allied Services	Electroplating	lph						5								16			METHODOLOGY FOR CHROMIUM ONLY; DELETED OLD DATA
2309100030	Fabricated Metals: SIC 34	Coating, Engraving, and Allied Services	Plating: Metal Deposition	lph						5								16			METHODOLOGY FOR CHROMIUM ONLY; DELETED OLD DATA
2309100050	Fabricated Metals: SIC 34	Coating, Engraving, and Allied Services	Anodizing	lph						2								16		4	METHODOLOGY FOR CHROMIUM ONLY; DELETED OLD DATA
2311010000	Construction: SIC 15 - 17	Residential	Total	DJS			64														
2311020000	Construction: SIC 15 - 17	Industrial/Commercial/Institutional	Total	DJS			60														MISSING PS CY (021)
2311030000	Construction: SIC 15 - 17	Road Construction	Total	DJS			64														
2325000000	Mining and Quarrying: SIC 14	All Processes	Total	lph						32	32										NEED TO REFINE METHODOLOGY IN FUTURE
2399000000	Industrial Processes: NEC	Industrial Processes: NEC	Total							6	4										UNKNOWN ACTIVITY DATA AND METHDOLOGY; DELETING CATEGORY
2401001000	Surface Coating	Architectural Coatings	Total: All Solvent Types	lph			208											16			RECALCULATED VOC EMISSIONS USING EPA METHOD
2401005000	Surface Coating	Auto Refinishing: SIC 7532	Total: All Solvent Types	lph														208		30	ADDITIONAL CALCULATIONS AND SPECIATION AFTER JUNE 04
2401008000	Surface Coating	Traffic Markings	Total: All Solvent Types	lph				25										224		150	
2401015000	Surface Coating	Factory Finished Wood: SIC 2426 thru 242	Total: All Solvent Types	lph														112			VERIFIED BY LPH
2401020000	Surface Coating	Wood Furniture: SIC 25	Total: All Solvent Types	lph														112			VERIFIED BY LPH
2401025000	Surface Coating	Metal Furniture: SIC 25	Total: All Solvent Types	lph			9														verified by Dave & Lisa
2401030000	Surface Coating	Paper: SIC 26	Total: All Solvent Types	lph			11														verified by Dave & Lisa
2401040000	Surface Coating	Metal Cans: SIC 341	Total: All Solvent Types	lph														16			ZERO ACTIVITY DATA IN ME; DELETED CATEGORY
2401050000	Surface Coating	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Total: All Solvent Types	lph														112			VERIFIED BY LPH
2401055000	Surface Coating	Machinery and Equipment: SIC 35	Total: All Solvent Types	lph														112			VERIFIED BY LPH
2401060000	Surface Coating	Large Appliances: SIC 363	Total: All Solvent Types	lph														96			VERIFIED BY LPH

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2401065000	Surface Coating	Electronic and Other Electrical: SIC 36 - 363	Total: All Solvent Types	lph														64			VERIFIED BY LPH
2401070000	Surface Coating	Motor Vehicles: SIC 371	Total: All Solvent Types	lph			16											128			CALCULATIONS COMPLETED AFTER JUNE 04
2401075000	Surface Coating	Aircraft: SIC 372	Total: All Solvent Types	lph														14			NEW CATEGORY AND CALCULATION SINCE JUNE 04
2401080000	Surface Coating	Marine: SIC 373	Total: All Solvent Types	lph														112			VERIFIED BY LPH
2401085000	Surface Coating	Railroad: SIC 374	Total: All Solvent Types	lph														7			REVISED CALCULATIONS AFTER JUNE 04
2401090000	Surface Coating	Miscellaneous Manufacturing	Total: All Solvent Types	lph														96			VERIFIED BY LPH
2401100000	Surface Coating	Industrial Maintenance Coatings	Total: All Solvent Types	lph				23										224		120	REVISED CALCULATIONS AFTER JUNE 04
2401200000	Surface Coating	Other Special Purpose Coatings	Total: All Solvent Types	lph														96			REVISED CALCULATIONS AFTER JUNE 04
2415000000	Degreasing	All Processes/All Industries	Total: All Solvent Types	djs														80			DELETED CATEGORY; DOUBLE COUNTING OF EMISSIONS IN SUBCATEGORIES BELOW
2415030000	Degreasing	Electronic and Other Elec. (SIC 36): All Processes	Total: All Solvent Types	djs														80			REVISED CALCULATIONS AFTER JUNE 04
2415045000	Degreasing	Miscellaneous Manufacturing (SIC 39): All Processes	Total: All Solvent Types	djs														80			REVISED CALCULATIONS AFTER JUNE 04
2415065000	Degreasing	Auto Repair Services (SIC 75): All Processes	Total: All Solvent Types	djs														80			REVISED CALCULATIONS AFTER JUNE 04
2415300000	Degreasing	All Industries: Cold Cleaning	Total: All Solvent Types	DJS														80			REVISED CALCULATIONS AFTER JUNE 04
2420000000	Dry Cleaning	All Processes	Total: All Solvent Types	RTG																56	DELETED CATEGORY; ONLY POLLUTANT OF CONCERN IS PERC
2420000055	Dry Cleaning	All Processes	Perchloroethylene	RTG														16			VERIFIED BY RTG
2425000000	Graphic Arts	All Processes	Total: All Solvent Types	djs														112		3	DELETED S-99 DATA
2430000000	Rubber/Plastics	All Processes	Total: All Solvent Types	LPH			13														INCLUDED IN HAP POINT SOURCE; CATEGORY DELETED
2440000000	Miscellaneous Industrial	All Processes	Total: All Solvent Types	djs			13														MISSING AN (001), PS (021), SC (023) COUNTIES; DELETED EPA CATEGORY; APPEARS TO BE DOUBLE COUNTING OF EMISSIONS IN SCC2440020000
2440020000	Miscellaneous Industrial	Adhesive (Industrial) Application	Total: All Solvent Types	djs			16														
2460100000	Miscellaneous Non-industrial: Consumer and Commercial	All Personal Care Products	Total: All Solvent Types	djs														160			
2460200000	Miscellaneous Non-industrial: Consumer and Commercial	All Household Products	Total: All Solvent Types	djs			16											304			
2460400000	Miscellaneous Non-industrial: Consumer and Commercial	All Automotive Aftermarket Products	Total: All Solvent Types	djs														304			
2460500000	Miscellaneous Non-industrial: Consumer and Commercial	All Coatings and Related Products	Total: All Solvent Types	djs														320			
2460600000	Miscellaneous Non-industrial: Consumer and Commercial	All Adhesives and Sealants	Total: All Solvent Types	djs			16											336			EPA ADDED DIBENZOFURAN TO ME SUBMITTAL

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2460800000	Miscellaneous Non-industrial: Consumer and Commercial	All FIFRA Related Products	Total: All Solvent Types	djs			16											288			TRIETHYLAMINE ADDED BY EPA AFTER JUNE 04 SUBMISSION
2460900000	Miscellaneous Non-industrial: Consumer and Commercial	Miscellaneous Products (Not Otherwise Covered)	Total: All Solvent Types	djs														160			
2461021000	Miscellaneous Non-industrial: Commercial	Cutback Asphalt	Total: All Solvent Types	djs														64			
2461850000	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	All Processes	djs														112			
2465200000	Miscellaneous Non-industrial: Consumer	Household Products	Total: All Solvent Types	djs			16														DELETING EPA CATEGORY; APPEARS TO BE DOUBLE COUNTING OF EMISSIONS IN SCC 2460200000
2501050120	Petroleum and Petroleum Product Storage	Bulk Stations/Terminals: Breathing Loss	Gasoline	TLG						11											INCLUDED IN POINT SOURCES; CATEGORY DELETED
2501060050	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Total	TLG																132	DELETED CATEGORY; EMISSIONS NOW REPRESENTED BY SUBCATEGORIES; ELIMINATES DOUBLE COUNTING
2501060051	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Submerged Filling	TLG														176			NEW SUBCATGORY; CALCULATIONS DONE AFTER JUNE 04
2501060052	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Splash Filling	TLG						16											EMISSIONS AND CATEGORY DELETED; SPLASH FILLING BANNED IN MAINE IN 2000
2501060053	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Balanced Submerged Filling	TLG														176			REVISED CALCULATIONS AFTER JUNE 04
2501060100	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Total	TLG						39								160		120	CALCULATION DONE AFTER JUNE 04
2501060201	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Underground Tank: Breathing and Emptying	djs														176		16	CALCULATION DONE AFTER JUNE 04
2501080050	Petroleum and Petroleum Product Storage	Airports : Aviation Gasoline	Stage 1: Total	TLG			165														
2501080100	Petroleum and Petroleum Product Storage	Airports : Aviation Gasoline	Stage 2: Total	TLG			165														
2505020030	Petroleum and Petroleum Product Transport	Marine Vessel	Crude Oil	TG														4			
2505020060	Petroleum and Petroleum Product Transport	Marine Vessel	Residual Oil	TG														4			
2505020090	Petroleum and Petroleum Product Transport	Marine Vessel	Distillate Oil	TG														4			
2505020120	Petroleum and Petroleum Product Transport	Marine Vessel	Gasoline	TG														4			
2505020180	Petroleum and Petroleum Product Transport	Marine Vessel	Kerosene	TG														4			

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2505030120	Petroleum and Petroleum Product Transport	Truck	Gasoline	djs														176		16	CALCULATIONS DONE AFTER JUNE 04
2601000000	On-site Incineration	All Categories	Total	LPH						96										48	INCLUDES CAP EMISSIONS FOR CREMATION CATEGORIES AND BIOMED INCINERATION
2610000100	Open Burning	All Categories	Yard Waste - Leaf Species Unspecified	DWW			448														DW-EPA's 2002 NEI methodology is OK
2610000400	Open Burning	All Categories	Yard Waste - Brush Species Unspecified	DWW			448														DW-EPA's 2002 NEI methodology is OK
2610030000	Open Burning	Residential	Household Waste (use 26-10-000-xxx for Yard Wastes)	DWW			832											832			REVISED CALCULATIONS AFTER JUNE 04 TO CONSIDER STATEWIDE BAN ON OPEN BURNING OF MSW AND COMPLIANCE RATE
2620000000	Landfills	All Categories	Total	lph														480			ADDED VOC EMISSIONS
2630020000	Wastewater Treatment	Public Owned	Total Processed	lph			880														EPA generated based on population
2640000000	TSDFs	All TSDF Types	Total: All Processes	lph														2		30	CALCULATIONS DONE AFTER JUNE 04
2660000000	Leaking Underground Storage Tanks	Leaking Underground Storage Tanks	Total: All Storage Types	djs														96			
2680001000	Composting	100% Biosolids (e.g., sewage sludge, manure, mixtures of these matls)	All Processes	DWW													64				
2680002000	Composting	Mixed Waste (e.g., a 50:50 mixture of biosolids and green wastes)	All Processes	DWW													64				
2801000003	Agriculture Production - Crops	Agriculture - Crops	Tilling	TLG					64												
2801500000	Agriculture Production - Crops	Agricultural Field Burning - whole field set on fire	Total, all crop types	djs						8	8									18	DELETED ZERO VALUE EM RECORDS AND NON-STATE DATA
2801700001	Agriculture Production - Crops	Fertilizer Application	Anhydrous Ammonia	TLG													16				
2801700002	Agriculture Production - Crops	Fertilizer Application	Aqueous Ammonia	TLG													16				
2801700003	Agriculture Production - Crops	Fertilizer Application	Nitrogen Solutions	TLG													16				
2801700004	Agriculture Production - Crops	Fertilizer Application	Urea	TLG													16				
2801700005	Agriculture Production - Crops	Fertilizer Application	Ammonium Nitrate	TLG													16				
2801700006	Agriculture Production - Crops	Fertilizer Application	Ammonium Sulfate	TLG													16				
2801700007	Agriculture Production - Crops	Fertilizer Application	Ammonium Thiosulfate	TLG													16				
2801700010	Agriculture Production - Crops	Fertilizer Application	N-P-K (multi-grade nutrient fertilizers)	TLG													16				
2801700011	Agriculture Production - Crops	Fertilizer Application	Calcium Ammonium Nitrate	TLG													16				

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2801700012	Agriculture Production - Crops	Fertilizer Application	Potassium Nitrate	TLG													16				
2801700013	Agriculture Production - Crops	Fertilizer Application	Diammonium Phosphate	TLG													16				
2801700014	Agriculture Production - Crops	Fertilizer Application	Monoammonium Phosphate	TLG													16				
2801700015	Agriculture Production - Crops	Fertilizer Application	Liquid Ammonium Polyphosphate	TLG													16				
2801700099	Agriculture Production - Crops	Fertilizer Application	Miscellaneous Fertilizers	TLG													16				
2805001100	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Confinement	TLG													16				
2805001200	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Manure handling and storage	TLG													16				
2805001300	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Land application of manure	TLG													16				
2805002000	Agriculture Production - Livestock	Beef cattle production composite	Not Elsewhere Classified	TLG													16				
2805003100	Agriculture Production - Livestock	Beef cattle - finishing operations on pasture/range	Confinement	TLG													16				
2805007100	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Confinement	TLG													16				
2805007300	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Land application of manure	TLG													16				
2805008100	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Confinement	TLG													16				
2805008200	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Manure handling and storage	TLG													16				
2805008300	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Land application of manure	TLG													16				
2805009100	Agriculture Production - Livestock	Poultry production - broilers	Confinement	TLG													16				
2805009200	Agriculture Production - Livestock	Poultry production - broilers	Manure handling and storage	TLG													16				
2805009300	Agriculture Production - Livestock	Poultry production - broilers	Land application of manure	TLG													16				
2805010100	Agriculture Production - Livestock	Poultry production - turkeys	Confinement	TLG													16				

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SCC	SCC_L2	SCC_L3	SCC_L4	Primary Contact	E-00-X	E-01-X	E-02-X	E-98-F	E-98-G	E-99-F	E-99-F-PR	M-91-F	M-93-F	M-96-F	M-98-F	M-99-F	P-02-X	S-02-X	S-02-X-PR	S-99-F	COMMENTS
2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2805010200	Agriculture Production - Livestock	Poultry production - turkeys	Manure handling and storage	TLG													16				
2805010300	Agriculture Production - Livestock	Poultry production - turkeys	Land application of manure	TLG													16				
2805018000	Agriculture Production - Livestock	Dairy cattle composite	Not Elsewhere Classified	TLG													16				
2805019100	Agriculture Production - Livestock	Dairy cattle - flush dairy	Confinement	TLG													16				
2805019200	Agriculture Production - Livestock	Dairy cattle - flush dairy	Manure handling and storage	TLG													16				
2805019300	Agriculture Production - Livestock	Dairy cattle - flush dairy	Land application of manure	TLG													16				
2805021100	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Confinement	TLG													16				
2805021200	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Manure handling and storage	TLG													16				
2805021300	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Land application of manure	TLG													16				
2805022100	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Confinement	TLG													16				
2805022200	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Manure handling and storage	TLG													16				
2805022300	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Land application of manure	TLG													16				
2805023100	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Confinement	TLG													16				
2805023200	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Manure handling and storage	TLG													16				
2805023300	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Land application of manure	TLG													16				
2805025000	Agriculture Production - Livestock	Swine production composite	Not Elsewhere Classified (see also 28-05-039, -047, -053)	TLG													16				
2805030000	Agriculture Production - Livestock	Poultry Waste Emissions	Not Elsewhere Classified (see also 28-05-007, -008, -009)	TLG													16				
2805030007	Agriculture Production - Livestock	Poultry Waste Emissions	Ducks	TLG													16				
2805030008	Agriculture Production - Livestock	Poultry Waste Emissions	Geese	TLG													16				
2805035000	Agriculture Production - Livestock	Horses and Ponies Waste Emissions	Not Elsewhere Classified	TLG													16				

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
2805039100	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Confinement	TLG													16				
2805039200	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Manure handling and storage	TLG													16				
2805039300	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Land application of manure	TLG													16				
2805040000	Agriculture Production - Livestock	Sheep and Lambs Waste Emissions	Total	TLG													16				
2805045000	Agriculture Production - Livestock	Goats Waste Emissions	Not Elsewhere Classified	TLG													16				
2805047100	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Confinement	TLG													16				
2805047300	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Land application of manure	TLG													16				
2805053100	Agriculture Production - Livestock	Swine production - outdoor operations (unspecified animal age)	Confinement	TLG													16				
2810001000	Other Combustion	Forest Wildfires	Total	DWW			288											640	64		REVISED CALCULATIONS AFTER JUNE 04
2810005000	Other Combustion	Managed Burning, Slash (Logging Debris)	Total	djs														8	4		ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
2810010000	Other Combustion	Human Perspiration and Respiration	Total	djs																195	FOREST WILDFIRE (2810001000) CODED INCORRECTLY IN 1999 NEI; DATA IN PROPER CATEGORY IN 2002 NEI
2810015000	Other Combustion	Prescribed Burning for Forest Management	Total	djs			1											624			REVISED CALCULATIONS AFTER JUNE 04
2810020000	Other Combustion	Prescribed Burning of Rangeland	Total	djs														624	8		REVISED CALCULATIONS AFTER JUNE 04
2810030000	Other Combustion	Structure Fires	Total	djs														144		15	DELETED OLD DATA
2810050000	Other Combustion	Motor Vehicle Fires	Total	djs																48	CATEGORY DELETED; NEGLIGIBLE EMISSIONS
2810060100	Other Combustion	Cremation	Humans	djs						48								65			REVISED CALCULATIONS AFTER JUNE 04
2810060200	Other Combustion	Cremation	Animals	djs						24								99		74	REVISED CALCULATIONS AFTER JUNE 04
2830000000	Catastrophic/Accidental Releases	All Catastrophic/Accidential Releases	Total	djs			33														AN CY ONLY (001); SCRAP TIRE FIRE
2830010000	Catastrophic/Accidental Releases	Transportation Accidents	Total	DJS														176			OIL SPILLS AND ACCIDENTS; NEW CATEGORY AND CALCULATIONS SINCE JUNE 04
2861000000	Fluorescent Lamp Breakage	Total	Total	djs			16											16			DELETING EPA'S DATA IN FAVOR OF ME DATA
2862000000	Swimming Pools	Total (Commercial, Residential, Public)	Total	DWW						16											

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
30100802	Chemical Manufacturing	Chloro-alkali Production	Liquefaction (Mercury Cell Process)																	2	INCLUDED IN POINT SOURCE; CATEGORY DELETED
30101880	Chemical Manufacturing	Plastics Production	Reactor (Polyurethane)										8								INCLUDED IN POINT SOURCE; CATEGORY DELETED
30200756	Food and Agriculture	Grain Millings	Wet Corn Milling: Milling																	1	INCLUDED IN POINT SOURCE; CATEGORY DELETED
30500201	Mineral Products	Asphalt Concrete	Rotary Dryer: Conventional Plant (see 3-05-002-50 to -53 for subtypes)	djs																1147	INCLUDED IN POINT SOURCE; CATEGORY DELETED
30500799	Mineral Products	Cement Manufacturing (Wet Process)	Other Not Classified																	1	INCLUDED IN POINT SOURCE; CATEGORY DELETED
30801005	Rubber and Miscellaneous Plastics Products	Plastic Products Manufacturing	Foam Production - General Process										2							15	INCLUDED IN HAP POINT SOURCES; CATEGORY DELETED
30900199	Fabricated Metal Products	General Processes	Other Not Classified																	6	CATEGORY DELETED
30901006	Fabricated Metal Products	Electroplating Operations	Entire Process: Chrome																	4	DELETED; PREVIOUSLY COUNTED UNDER SCC2309100010
30906001	Fabricated Metal Products	Porcelain Enamel/Ceramic Glaze Spraying	Spray Booth																	1	ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31000299	Oil and Gas Production	Natural Gas Production	Other Not Classified											18							ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31301001	Electrical Equipment	Light Bulb Manufacture	Light Bulb Glass to Socket Base Lubrication with SO2																	1	ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31301200	Electrical Equipment	Fluorescent Lamp Recycling	Fluorescent Lamp Recycling: Lamp Crusher	djs			16														ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31401501	Transportation Equipment	Boat Manufacturing	General																	9	INCLUDED IN POINT SOURCE; CATEGORY DELETED
31502088	Photo Equip/Health Care/Labs/Air Condit/SwimPools	Health Care - Hospitals	Laboratory Fugitive Emissions																	15	ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31502500	Photo Equip/Health Care/Labs/Air Condit/SwimPools	Dental Alloy (Mercury Amalgams) Production	Dental Alloy (Mercury Amalgams) Production: Overall Process	djs						8										9	ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
31503001	Photo Equip/Health Care/Labs/Air Condit/SwimPools	Laboratories	Bench Scale Reagents: Research	djs														16			
33000198	Textile Products	Miscellaneous	Other Not Classified																	1	ZERO ACTIVITY DATA IN MAINE; CATEGORY DELETED
39092050	In-process Fuel Use	Fuel Storage - Pressure Tanks	Natural Gas: Withdrawal Loss	DWW																17	INCLUDED IN POINT SOURCE; CATEGORY DELETED

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2302003100	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	TLG														256			
40202301	Surface Coating Operations	Large Ships	Prime Coating Operation	LPH																5	INCLUDED IN POINT OR MARINE COATINGS CATEGORY; CATEGORY DELETED
50100701	Solid Waste Disposal - Government	Sewage Treatment	Entire Plant	lph																795	INCLUDED UNDER POTWS; CATEGORY DELETED
68240059	Miscellaneous Processes	Paint Stripper Users - Chemical Strippers	Application, Degradation, and Coating Removal Steps: Other Not Listed	lph											16						verified by Dave & Lisa

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